CHARGING SOLUTIONS

LIFESPEED® Mod3

HAWKER LIFESPEED® MOD3 LS3 BATTERY CHARGER

OWNER'S MANUAL

IMPORTANT: Read and understand your owner's manual before installing, operating, or servicing this product.
DO NOT DESTROY THIS BOOK.

Skip to page 33 for Models: LSM3 and LSM3C (CEC)

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CONTENTS

CONTENTS

CONTENTS

Skip to page 33 for Models: LSM3 and LSM3C (CEC)

INTRODUCTION

LIFESPEED® Mod3

The information contained in this document is critical for safe handling and proper use of the HAWKER LIFESPEED® MOD3 chargers. It contains a global system specification as well as related safety measures, codes of behavior, a guideline for commissioning, and recommended maintenance. This document must be retained and available for users working with and responsible for the charger. All users are responsible for ensuring that all applications of the system are appropriate and safe, based on conditions anticipated or encountered during operation.

This owner's manual contains important safety instructions. Read and understand the sections on safety and operation of the charger before operating the charger and the equipment into which it is installed.

It is the owner's responsibility to ensure the correct use of the documentation and any activities related thereto, and to follow all legal requirements applicable to themselves and the applications in the respective countries.

This owner's manual is not intended to substitute for any training on handling and operating the industrial truck or HAWKER LIFESPEED® MOD3 chargers that may be required by local laws and/or industry standards. Proper instruction and training of all users must be ensured prior to any contact with the charger system.

Refer to the Terms and Abbreviations on page 15.

For service, contact your sales representative or call:
1-877-7HAWKER (USA and Canada)
www.hawkerpowersource.com

Your Safety and the Safety of Others is Very Important

⚠ WARNING You can be killed or seriously injured if you don't follow instructions.

FEATURES & INFORMATION

Features

- Microprocessor-controlled
- Able to auto-identify battery's capacity
- Able to adapt to State of Charge (SoC) in IONIC charging profile
- Compatible with battery voltages of 24, 36, 48, 60, 64, 72 and 80
- Wireless integration with HAWKER® BBWC battery monitoring devices
- Individual battery pack recognition and automatic pairing with the charger
- Unique IONIC charge profile for flooded
- Unique profiles for HAWKER® battery charge applications
- Remote access via HAWKER® MOD-ifi™ smart device app to change settings, monitor charger and share data
- Controller Area Network (CAN) communication capable
- Fully programmable to unique fleet requirements

Technical Information

Main Nameplates (UL model number) vs. Configured Ratings (Part number) labels

There are two nameplates located on the outside of the charger. The main nameplate includes the UL model number and the ratings of the cabinet at its full capacity, while the "Configured Ratings" nameplate includes the part number and the ratings of the cabinet as configured. **The Configured Ratings nameplate label must be replaced when adding or removing modules permanently in the field.**

The part number is required in any discussion or correspondence regarding this unit.

Figures 1 & 2: Nameplate labels

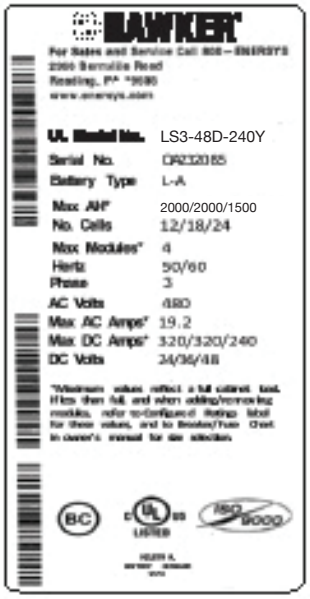


Figure 1

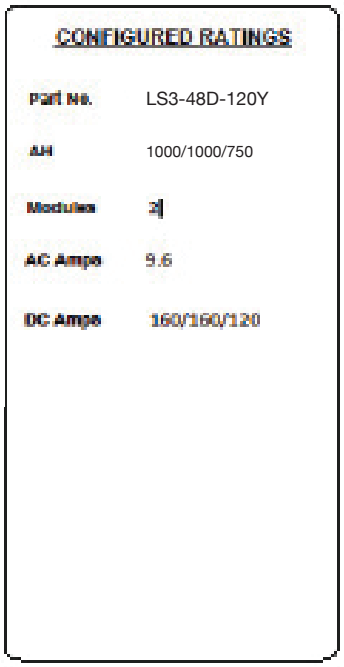


Figure 2

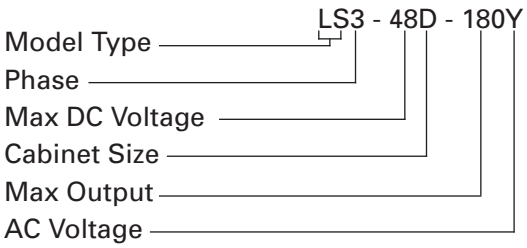
Technical Information (cont.)

Nameplate Label Definitions

Item	Description
UL Model Number	UL-recognized number that indicates the ratings of the cabinet at its full capacity
Serial Number	Provides date code
Battery Type	L-A: Lead-Acid
Max Ah	Maximum amp-hour capacity of this cabinet
No. Cells	Number of battery cells this unit will charge. **Any battery connected to the charger output should have the same number of cells**
Max Modules	Maximum number of modules the cabinet can hold
Hertz	AC input voltage frequency. **Under no conditions operate the charger at a different frequency or from a generator with unstable frequency**
Phase	Number "3" indicates a three-phase charger; number "1" indicates a single-phase charger
AC Volts	Nominal voltage for which this charger is rated to operate
Max AC Amps	Maximum AC amps for which this cabinet is rated
Max DC Amps	Maximum output DC amps for which this charger is rated
DC Volts	Nominal DC output voltage of the charger
Part Number	Indicates the complete information about the charger
Ah	Largest ampere-hour (Ah) capacity of the battery this charger is designed to charge efficiently as configured
Modules	Actual number of power modules installed in the charger cabinet
AC Amps	AC current drawn by the charger with the number of power modules shown in Configured Ratings nameplate
DC Amps	DC current that this charger will deliver to a discharged battery with the number of power modules installed
CEC	Logo is applied to chargers that are certified by the California Energy Commission in compliance with Appliance Efficiency Regulations
cULus	Logo is applied to chargers that have been tested to applicable standards and requirements by Underwriter Laboratories (UL) and the Canadian Standards Association (CSA)

Part Number Decoder

Single Display Cabinet



Technical Information (cont.)

Cabinet Size (number of modules available) and DC Cable Size

Letter Code	Module Positions	Standard Cable Gauge	Comments
D	4	3/0	Four slot, 3.5 kW cabinet
F	6	3/0	Six slot, 3.5 kW cabinet
H	8	3/0	Eight slot, 3.5 kW cabinet

AC Line Voltage

Letter Code	Voltage(s) (volts rms)	Line Frequency (Hertz)	Comments
C	600	50/60	600 VAC only
G	208/220/240	50/60	208/220/240 VAC
Y	480	50/60	480 VAC only

Suffix	Description
R	Remote control capable (order remote control separately)
F	Red/Green Next Battery Capable – USED in conjunction with BSI and BSS
V	PLC capable
E	LAN (ethernet compatible)

CABLES

Extra length charging leads (10’ standard w/charger)

Suffix	Cable Length
1	15 ft. charging lead
2	20 ft. charging lead
3	25 ft. charging lead
4	30 ft. charging lead

NOTES:

- AC input voltage + 10%
- Frequency Hz 50/60
- Battery cable length: 10 ft standard – optional 15, 20, 25, 30 ft.
- IP protection IP20
- Operating temperature 32 to 113°F
- Display – TFT LCD

Technical Information (cont.)

Charger Profile

Charger Profile	Description
IONIC	The IONIC charge profile diagnoses the battery status throughout the recharge phase and adjusts its parameters to optimize the charge of flooded battery technology. Short current pulses injected during charge stimulate gas formation in the active material, allowing for a better density distribution of sulfuric acid (homogenization) across the surface of the plates. Being performed during the regular charge, this sophisticated form of equalization improves charge efficiency in terms of charge time reduction and heat generation.
OPP	Designed for opportunity charging operations. It includes a start rate of up to 25% C6 and an equalize charge performed once a week. The weekly equalize charge can be programmed to run automatically.
Fast	Designed for flooded L-A batteries at up to 0.50 C6 charging rates.

(*) Opportunity Profile Options (OPP)
Operation: In opportunity charging mode, the user can charge the battery during breaks, lunch, or any available time during the work schedule. The opportunity charge profile allows the battery to be safely charged while it is kept in a partial state of charge between 20% and 80% of C6 throughout the work week. Sufficient time should be scheduled after the weekly equalize charge to allow battery cooling and to perform periodic electrolyte level checks.

Daily Charge: This option can be set to add additional daily charging time if the work schedule allows. Recommended to be used any time OPP profile is selected.

Equalization Charging
Equalization charging for traditional flooded lead-acid and TPPL batteries, performed after normal charging, balances the electrolyte densities in the battery's cells.

Block-Out Time
This function inhibits the charger from charging the battery during the block-out time window. If a charge cycle has started before the block-out window, it is inhibited during the block-out window and will automatically restart the charge cycle at the end of the block-out window.

Refresh Charging
Refresh or maintenance charging enables the charger to maintain the battery at a maximum state of charge as long as it is attached to the charger.

Technical Information (cont.)

Specialty Charger Option List

Suffix	Description
C6	6 ft of AC cord
C10	10 ft of AC cord
C12	12 ft of AC cord
C18	18 ft of AC cord
L10*	10 ft of DC cable
L13	13 ft of DC cable
L15*	15 ft of DC cable
L18	18 ft of DC cable
L20*	20 ft of DC cable
L25	25 ft of DC cable
L30	30 ft of DC cable
PLC	Programmable Logic Controller
R	Remote ready
IR	Remote Installed
LM2	Late Break/Early Make
CAN	Controller Area Network
Ethernet	Network Connection

Serial Number
This number indicates complete information about the specific charger. It must be supplied with the part number in any correspondence or discussion regarding this charger.

Battery Type
The chemical content construction of the battery this unit is designed to charge is given in this part of the nameplate. (L-A = Lead-Acid)

Max Ah
This is the maximum amp-hour capacity of this cabinet.

No. Cells
This is the number of battery cells this unit will charge. **This number must match exactly with any battery connected to the charger output.**

Max Modules
This is the maximum number of modules the cabinet can hold.

⚠ WARNING THE NUMBER OF MODULES MUST MATCH THE NUMBER OF "CONFIG MODULES" ON THE NAMEPLATE. DO NOT ADD MORE MODULES IN THE FIELD. CONSULT THE MANUFACTURER IF MORE MODULES ARE NEEDED.

Config Modules
This is the number of modules for which this cabinet is configured.

Hertz
This gives the frequency in cycles per second of the AC input voltage. Under no conditions operate the charger at a different frequency or from a generator with unstable frequency.

Technical Information (cont.)

Phase
Number “3” indicates a three-phase charger and “1” indicates a single-phase charger.

AC Volts
This is the nominal voltage for which this charger is rated. The charger will only operate on this voltage.

Config AC Amps
This is the AC amps for which this charger is configured.

Max AC Amps
This is the maximum AC amps for which this cabinet is rated.

Max DC Amps
This is the maximum output DC amps for which this charger is rated.

DC Volts
This gives the nominal DC output voltage of the charger.

Config DC Amps
This is the output DC amps this charger is configured to deliver to a battery that is over 20% discharged.

CEC
This logo is applied to chargers that are certified with the California Energy Commission in compliance with Appliance Efficiency Regulations:

BC

cULus
This logo is applied to chargers that have been tested to applicable standards and requirements by Underwriters Laboratories (UL) and the Canadian Standards Association (CSA):

c UL US
LISTED

SAFETY & INSTALLATION

Safety

Important Safety Instructions

- **⚠ WARNING** The shipping pallet must be removed for proper and safe operations.
- This manual contains important safety and operating instructions. Before using the battery charger, read all instructions, cautions and warnings on the battery charger, the battery, and the product using the battery.
- Read and understand all setup and operating instructions before using the battery charger, to prevent damage to the battery and to the charger.
- Do not touch non-insulated parts of the output connector or the battery terminals to prevent electrical shock.
- During charge, lead-acid batteries produce hydrogen gas, which can explode if ignited. Never smoke, use an open flame, or create sparks in the vicinity of the battery. Ventilate well when the battery is in an enclosed space.
- Unless the charger is equipped with LM2 (Late Break/Early Make) feature, **do no**t connect or disconnect the battery plug while the charger is on. Doing so will cause arcing and burning of the connector, resulting in charger damage or battery explosion.
- Lead-acid batteries contain sulfuric acid, which causes burns. **Do not** get in eyes, on skin, or on clothing. In cases of contact with eyes, flush immediately with clean water for 15 minutes. Seek medical attention immediately.
- Only factory-qualified personnel should install, set up, and service this equipment. De-energize all AC and DC power connections before servicing the charger.
- The charger is not for outdoor use.
- **Do not** expose the charger to moisture. Operating conditions should be 32°F (0°C) to 113°F (45°C); 0 to 70% relative humidity.
- **Do not** operate the charger if it has been dropped, received a sharp impact, or otherwise damaged in any way.
- For continued protection and to reduce the risk of fire, install chargers on a non-combustible surface.
- The DC cables of the charger emit low-power magnetic fields in their surroundings (<5cm). People with medical implant devices should avoid being near chargers while charging.

Installation

⚠ WARNING THE SHIPPING PALLET MUST BE REMOVED FOR PROPER AND SAFE OPERATION.

Location

For maximum safe operation, choose a location that is free of excess moisture, dust, combustible material, and corrosive fumes. Avoid locations where temperatures are high or where liquids will drip on the charger. Do not obstruct the ventilation openings or the space under the charger. Follow the charger warning label when mounting on or over a combustible surface.

Cabinet Mounting

The charger must be mounted on a wall, stand, shelf, or floor in a vertical position. The minimum distance between two chargers must be 12 inches. The charger will be installed with four 5/16-inch bolts or with the bracket supplied. See the Mounting Dimensions section. The charger should be permanently fastened in place.
For shelf mounting, part number 159-6LA22723 is required – two per charger.
NOTE: Ambient temperature at all levels cannot exceed 113° F (45° C).

Electrical Connections

To prevent failure of the charger, make sure it is connected to the correct line voltage.
Follow your local and National Electric Code (NEC) in making these connections.

⚠ WARNING MAKE SURE THE POWER TO THE CHARGER IS OFF AND THE BATTERY IS DISCONNECTED BEFORE CONNECTING THE INPUT POWER TO THE TERMINALS OF THE CHARGER.

Installation (cont.)

Connecting Input Power
Connect the input power to the appropriate terminals and apply the appropriate torque as follows:

Phase	Power (kW)	Cabinet (Bay)	Terminals			Torque (in-lbs)
3	2.5/3.5	4 and 6	L1	L2	L3	15
3	2.5/3.5	8	L1	L2	L3	25

Connecting Input Power (cont.)
- Three-phase chargers are not phase rotation sensitive and work with a grounded Delta or Wye electrical service configuration.

AC Circuit Protection
- The user must provide suitable branch circuit protection and a disconnect method from the AC power supply to the charger to allow for safe servicing.

⚠ CAUTION Risk of Fire. Use only on circuits provided with branch circuit protection in accordance with the Breaker/Fuse Chart table in this manual, and the National Electrical Code, NFPA 70.

AC Amps (A)	Breaker Fuse Size (A)
1 - 12	15
12.1 - 16	20
16.1 - 20	25
20.1 - 24	30
24.1 -28	35
28.1 - 32	40
32.1 - 36	45
36.1 - 40	50

AC Amps (A)	Breaker Fuse Size (A)
40.1 - 48	60
48.1 - 56	70
56.1 - 64	80
64.1 - 72	90
72.1 - 80	100
80.1 - 88	110
88.1 - 100	125

Grounding the Charger
- Connect the ground wire to the terminal marked with either of the two symbols below and apply same torque value.

⚠ DANGER FAILURE TO GROUND THE CHARGER COULD LEAD TO A FATAL ELECTRIC SHOCK. Follow National Electric Code for ground wire sizing.

DC Connector Polarity
- DC plug polarity.
- The charging cables are connected to the DC output of the charger: The red charging cable (POS) is connected to the positive busbar of the charger, and the black charging cable (NEG) is connected to the negative busbar of the charger. The output polarity of the charger must be observed when connecting to the battery. An improper connection will open the DC fuses in the power modules.

Glossary

Battery Boss™ WC (BBWC) Device
This unit, permanently mounted on the battery, ensures that certain battery parameters can be sent to the charger for the purposes of optimizing the charge and monitoring the charging and discharging characteristics.

Block-Out Time
This function inhibits the charger from charging the battery during the block-out time window. If a charge cycle has started before the block-out window, it is inhibited during the block-out window and will automatically restart the charge cycle at the end of the block-out window.

Charging Profile
The charging profile defines the rate of charge current over time. The charger adapts to the battery's age and level of discharge. Controlling the overcharge coefficient, whatever the battery's discharge level, reduces the amount of electricity consumed.

Fast Charging Profile
Designed for flooded L-A batteries at up to 0.50 C6 charging rates.

Equalization Charging
Equalization charging, performed after normal charging, balances the electrolyte densities in the battery's cells.

IONIC Charging Profile
This charging profile sends short pulses of current to stimulate gas formation in the active material, causing sulfuric acid to be distributed outside the plates. This system of mixing the electrolyte enables more rapid charging of flooded cell batteries subject to very high demands and balances out differences in density, homogenizing the electrolyte across the surface of the plates. It is intended to be used with flooded lead acid batteries.

Opportunity Charging Profile
The OPP charging profile is used when opportunity charging is desired. It has a start rate of 25% of the battery's rated amp-hour capacity, requires one complete recharge in every 24 hours of service and must have an equalize charge done once a week, which is programmed to run automatically.

TERMS AND ABBREVIATIONS

Description of Operation

General
HAWKER LIFESPEED® MOD3 chargers are microprocessor-controlled. The processor reads the battery's capacity from the BBWC device so that the charging profile can be automatically adapted to the battery's actual state over a wide range of capacities. HAWKER LIFESPEED® MOD3 chargers adapt to the battery's capacity and its discharge level. HAWKER LIFESPEED® MOD3 chargers are set to charge batteries within the range of the cell and amp-hour rating marked on the nameplate.

Starting the Charge Cycle
When a battery is connected to the charger, the control board senses the voltage and after a short delay, the charger starts charging the battery.

Charging Current
The charging current is determined by the battery voltage and state of the charge condition. Charging current declines automatically as battery voltage rises during the charge. As the battery charges, the graphical display will output various charge parameters including the percentage of battery capacity.

AC Power Fail
If the AC power fails with a battery connected to the charger during a charge cycle, the charger will reset and start a new charge cycle when power is restored. All charger settings as well as the time and date are preserved.

Series Charging
In series charging, the voltages of both batteries add up and must match the charger's nameplate DC volt rating. The charger's amp-hour rating must be equal to each battery's ampere-hour rating. The charge cycle will not start unless both batteries are connected.

Terms and Abbreviations

Term/ Abbreviation	Explanation/Description
AGV	Auto Guided Vehicle
Ah	Amp-Hour
AWG	American Wire Gauge
AVAIL	Available
CEC	California Energy Commission
dBm	Decibel-milliwatts
DF#	Fault Number
DoD	Depth of Discharge
GND	Ground
kW	Kilowatt

Term/ Abbreviation	Explanation/Description
MAC	Media Access Control
MANU	Manual
mVpc	Millivolts Per Cell
NEMA	National Electronics Manufacturers Association
SoC	State of Charge
TH	Thermal Fault
TH-Amb	Thermal–Ambient Temperature Faults
TFT	Thin Film Transistor

Operating Instructions

The HAWKER LIFESPEED® MOD3 charger series is compatible with batteries of 24, 36, 48, 60, 64, 72, and 80 volts (depending on the version supplied). Battery recognition (voltage, capacity, and state of charge) is accomplished automatically by the microprocessor. Charging profiles are IONIC, OPP, and Fast. Furthermore, equalization charges are integrated.

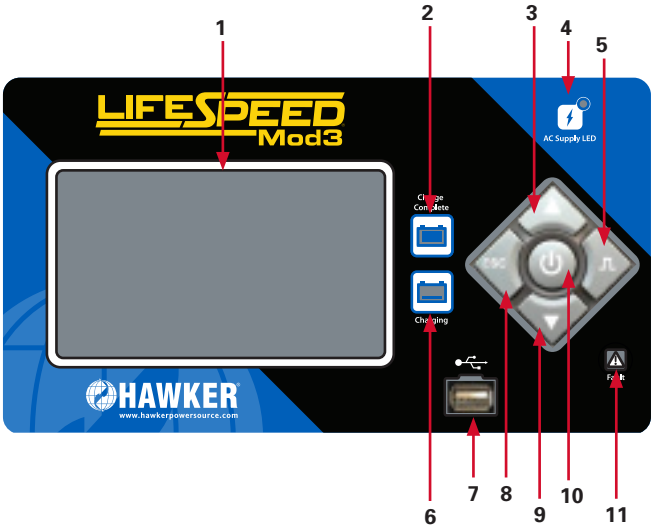
Ref	Function	Description
1	Graphical Thin Film Transistor (TFT) display	Display charger operation info/menus
2	GREEN charge complete indicator	OFF = charger off or battery not available Flashing = cooling phase ON = battery ready and available
3	Navigate UP button	Navigate menus/change values
4	BLUE AC supply indicator	OFF = AC missing ON = AC present
5	Navigate right/ equalize button	Scroll right/Start equalize or desulfation
6	YELLOW charging indicator	OFF = charger off or battery not available ON = charging in progress
7	USB port	Download memos/upload software
8	Navigate left/ESC button	Enter main menu/scroll left/ exit menus
9	Navigate DOWN button	Navigate menus/change values
10	Enter/stop and start button	Select menu items/enter values/stop and restart battery charge
11	RED fault indicator	OFF = no fault Flashing = ongoing fault detected ON = fault

Charge Operation

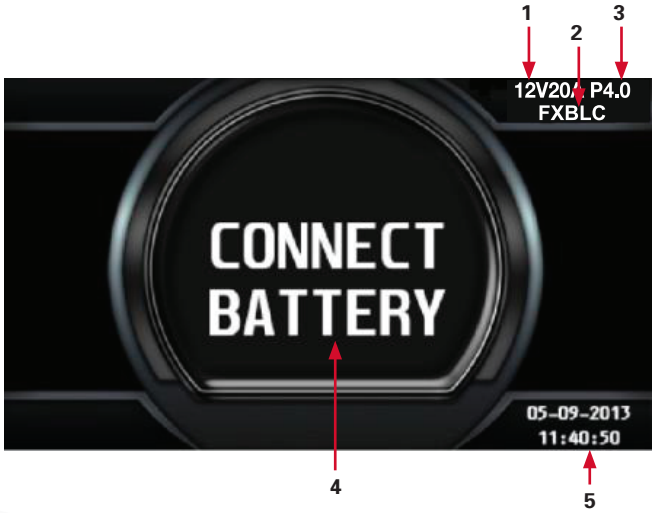
Charger idle display: With the charger in wait mode (no battery connected) and without pressing the enter/stop and start button, the display will show the following information:

Reference	Description
1	Charger DC Voltage
2	Selected Charge Profile
3	Firmware Version
4	Connect Battery
5	System Time and Date

The HAWKER LIFESPEED® MOD3 charger includes an adapter to communicate with a BBWC device. The BBWC device is an advanced battery module that measures, tracks, and stores important battery parameters such as temperature, electrolyte level, voltage, and Ah. This data is wirelessly transmitted to the HAWKER LIFESPEED® MOD3 charger to optimize charging, alert the operator to battery issues, and safeguard the battery from being permanently damaged.



Control Panel Features



Operating Instructions (cont.)

Charge Operation (cont.)

- **Connect battery:** Make sure the charger connector(s) match(es) the battery connector(s). Plug the charger connector(s) to the battery connector(s). For chargers with dual connectors, both connectors must be connected in order to start a charge.

Start Charging

When a battery is connected to the charger, the control board senses the voltage and after a short delay, the charger starts charging the battery automatically if Auto Start is set to ON. Push the enter/stop and start button if the battery is already connected. After a few seconds, the battery will close the charge contactor to initiate the charge. The charger will start the countdown process and will start displaying the charge information.

Delayed Start: If the charger was programmed for a delayed start, charging will begin following that delay. When the battery is plugged into the charger, the display shows the time remaining before the programmed charging starts. **Figure 3.**

Without a BBWC Device: If the BBWC device adapter is not enabled or no BBWC devices are in range, effective charging starts after the programmed delay. The charger uses Profile, Capacity and Temperature settings programmed in the Configuration menu.

PAIRING with a BBWC Device: If one or more BBWC device adapters are in range, the charger will turn on and apply current to the battery. The display will show "SCAN" followed by "IQLINK". This routine determines which BBWC device in range is connected to the battery charger. Once the charger makes the determination, it downloads data from BBWC device, displays the battery S/N, updates the profile capacity, and temperature for charging, and starts the main charge.

Figure 3

Operating Instructions

Reference	Description
1	Charge time
2	Charge current
3	Percent of charge
4	BBWC device warnings
5	USB connection
6	Charge voltage (total V and V/c), alternates with Ah returned
7	Battery temperature, alternates with battery capacity
8	Battery S/N from BBWC battery monitoring device
9	BBWC device link

Charging current (2) is determined by the battery voltage and state of the charge condition. Charging current declines automatically as battery voltage rises during the charge. As the battery charges, the graphical display will output various charge parameters including the percentage of battery capacity (6).

Stop Charging
The charging can be paused and restarted where it left off at any time. Just hit the enter/stop and start button (marked as number 10 in the Control Panel Features image on page 16). Remote is available for controlling at a distance.

Charge complete
Figure 4: End of charge display

End of charge without equalization
- The green complete LED comes on after the proper end of charge. The green complete LED is on and the display shows CHARGE COMPLETE. The display alternates between:
  - Total charging time
  - Amp-hours restored to the battery
- Any other lit LED indicates a problem during charging. Please refer to Troubleshooting section on pg 31 for more information.

Figure 4

- If the battery remains plugged in and a refresh charge has been enabled, refreshes will occur to maintain an optimal charge.
- The battery is now ready for use. Push the Oenter/ stop and start button before unplugging the battery.

End of charge with equalization
An equalize charge can be started manually or automatically.

Manual equalization start
- At the end of the charge (green LED on or flashing), press the <EQUALIZE> button. The equalize button can also be pressed at any time during the charge, and an equalize charge will be started after charging is complete.
- The start of the equalization charge is indicated by the symbol. During the equalization charge, the charger displays the output current and alternates, the battery voltage and voltage per cell, and the remaining time.

NOTE: When an equalize charge is manually started, the output will be set automatically.

Operating Instructions (cont.)

Automatic equalization start

- If an equalization day has been programmed in Charger configurations, the equalization charge will start automatically on the programmed day of the week after charging is complete.
- After the equalization, the battery will be available when the green LED comes back on and the display shows AVAIL. The battery is now ready for use. If the battery remains plugged in and a refresh charge has been enabled, refreshes will occur to maintain an optimal charge. Push the ON/OFF button before unplugging the battery.

AC power fail

If the AC power fails with a battery connected to the charger during a charge cycle, the charger will reset and start a new charge cycle when power is restored. All charger settings as well as the time and date are preserved.

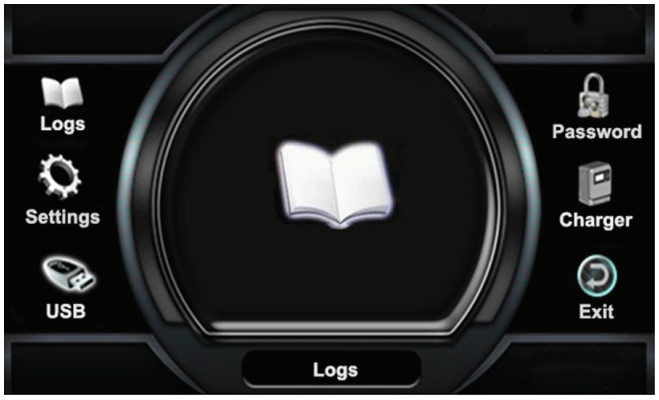
Series charging

In series charging, the voltages of both batteries add up and must match the charger's nameplate DC Volts rating. The charger's amp-hour rating must be equal to each battery's ampere-hour rating. The charge cycle will not start unless both batteries are connected.

Menu Access

Main Menu Display

When the charger is idle, press and hold the ESC button. The Main Menu is then displayed. The Main Menu is automatically exited after 60 seconds of inactivity or can be exited voluntarily by pressing the ESC button.



Main Menu

All menus are accessed from the Main Menu; a detailed description of each menu is included in the next sections of this manual. The menus that require a password are not displayed until the correct password has been entered.

The menus provide access to the following functions:

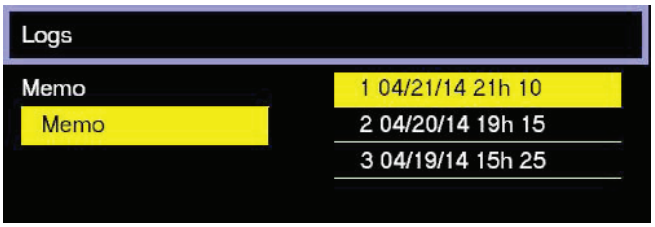
- Logs (): View status and memorizations.
- Charger (): Viewing of faults, alarms, etc.
- USB (): USB functions.
- Settings (): Setting of date, language, and others.
- Password (): Management of password.
- Exit (): Exit Main Menu.

Logs

Memorization Display Screen
The charger can display the details of the last 300 charge cycles.
The display here shows 3 charges have been stored in memory. MEMO 1 is the latest charge memorized. After memorizing the three-hundredth charge, the oldest record is deleted and replaced by the next oldest.

Displaying a Charge Cycle
Proceed as follows:

1. Select a record (Memo x) using the ▲/▼ buttons.
2. Display the first History screen by pressing Enter button.



3. Display the second History screen by pressing ▼.
4. Return to the Main Menu by pressing the ESC button.

The charge history is displayed; use ▲/▼ to scroll through the parameters.

Memorization Data

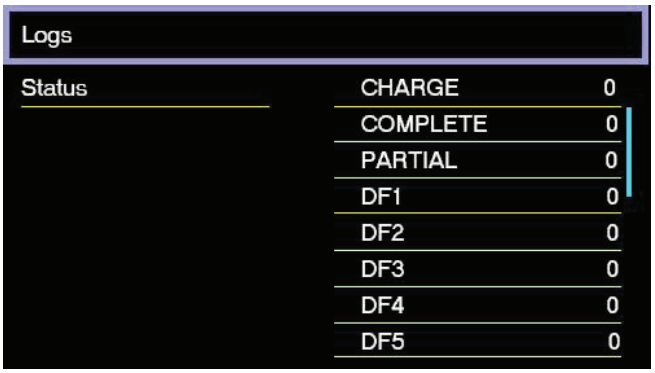
Memo	Description
S/N	BBWC device serial
Capacity	BBWC device serial Rated battery capacity (Ah)
U batt	Rated battery voltage (V)
Temp	Battery temperature at State of Charge (F)
Techno	Battery technology
Profile	Selected profile
% init	State of charge at State of Charge (%)
U start	Battery voltage at State of Charge (Vpc)
U end	Battery voltage at end of charge (Vpc)
Warning	BBWC device warnings

Memo	Description
I end	Current at end of charge
Temp end	Battery temperature at end of charge (F)
Chg Time	Time of the charge cycle (minutes)
Ah	Amp-hours returned during charge cycle
kWh	Kilowatt-hours returned during charge cycle
Status	Partial or Complete
Default	Fault codes
SoC	State of Charge date and time
DBa	Battery disconnect date and time
CFC	Termination code (for service tech)

Status

This menu displays the status of the charger's internal counters (number of normal and partial charges, fault code, etc.).

Status	Description
Charge	Total number of charges - corresponds to the total of normally terminated charges and charges terminated with or by faults.
Complete	Number of charges normally terminated.
Partial	Number of charges terminated abnormally.
DF1 etc.	Number of faults recorded by the charger (see Fault Codes).
TH	Number of charger temperature faults.
DFC	Number of DFC faults.



Status Screen

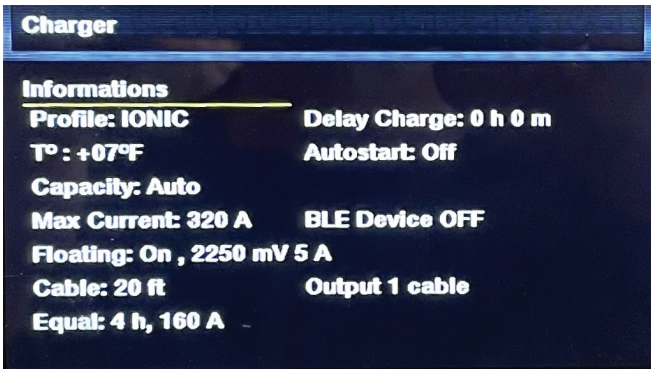
Status	Description
CNTAH	Cumulative Ah (odometer).
TH MOD	Individual MOD temp fault.

Charger

This menu displays information on the charger's configuration and output current of the charger and the power modules.

Information
This screen displays the following information on the charger's configuration.

Information	Description
Profile	Selected Charging Profile
Temperature	Programmed or BBWC device temperature
Capacity	Automatic or Manual
Max. Current	Maximum Current of Charger
Floating	ON/OFF
Cable	Length of DC Cable
Equal	Equalize Time and Current
Delay Charge	In Hours and Minutes
Auto Start	ON/OFF



Charger Information Display

Information	Description
BLE Device	ON/OFF
Output	1 Cable/2 Cable

Menu and Display Information

Parameter	Description
Date/Time	Sets date and time of the charger. The clock has a battery backup which will preserve the time when power to the charger is off.
Language	Selects the language displayed in the menus.
Region	Selects the format for date, metric (EU) or imperial (US) units for temperature, length and cable gauge in both metric and AWG.
Display	Set screen saver function and display themes.
Screen Saver	Enables or disables the screen saver function.
Delay Savings	Set the time the screen stays illuminated. The delay time is adjustable in minutes up to one hour and 59 minutes.
Themes	Themes A and B are two different ways that information is displayed throughout the charge cycle as seen in table below. Theme A is selected by default and will be used in this manual.
Daylight Savings	Enables or disables automatic clock adjustment for daylight savings time. When enabled, time will move ahead one hour at 02:00 on the second Sunday in March and will move back one hour at 02:00 on the first Sunday of November. The charger must be powered up at the time of the change for it to take effect.

USB

This menu provides access to the USB function to update software.
Software updates are provided by HAWKER®.

Update Software
Updates charger's internal software. The software is provided by HAWKER®.

Record Memo: Requires Password.
Save Settings: Requires Password.
Restore Settings: Requires Password.
Update Software: No Password Required.
Update Module: Requires Password.

Password

This is where the password is entered to gain access to service-level menus by authorized HAWKER® service representatives.

Settings

Parameters

Date/Hour
Sets the date and time of the charger. The clock has a battery backup which will preserve the time when power to the charger is off.

Serial Number
Password is required to access.

Language
Selects the language displayed in the menus.

Region
Selects the format for date, metric (EU), or imperial (US) units for temperature, length, and cable gauge.

Display
Set screen saver function and display themes.

Screen Saver
Enables or disables the screen saver function.

Delay
Set the time the screen stays illuminated. The delay time is adjustable in minutes, up to one hour and 59 minutes.

Themes
Themes A and B are two different ways that information is displayed throughout the charge cycle as seen in the table below. Theme A is selected by default and will be used in this manual.

Function	Theme A	Theme B
IDLE Screen		
	Battery Disconnects while Charging. Alternates every two seconds with CONNECT BATTERY.	
	Charger paused while battery connected.	
CHARGING Screen		

Settings (cont.)

Function	Theme A	Theme B
AVAIL Screen		
EQUALIZATION Screen		

Daylight Savings
Enables or disables automatic clock adjustment for daylight savings time. When enabled, time will move ahead one hour at 02:00 on the second Sunday in March and will move back one hour at 02:00 on the first Sunday of November. The charger must be powered up at the time of the change for it to take effect.

Charge

Charge Profile
The charging profile defines the rate of charge current over time. Select the correct charging profile for your application, such as IONIC, OPP, Cold, and Fast.

Without BBWC device: The profile selected will be used. Values stored in the BATTERY menu, such as CAPACITY and TEMPERATURE, are used to determine key charging parameters. Make sure these values match the battery to be charged or the battery may be over- or under-charged which will result in decreased battery life or performance.

With BBWC device: The appropriate profile for the battery technology will be selected at the State of Charge. Battery capacity and temperature will also be transmitted to the charger control.

Auto Start
To enable Auto Start, select ON, or to disable, select OFF. When Auto Start is enabled, the charger will start whenever a battery is plugged in, and if it's off, the user will have to press the enter/stop and start button to start a charge.

Charge Delay
Type – Sets OFF, DELAY, or TIME OF DAY.
Value hour delay – Sets the amount or time of day for the delay (00:00 to 24:00).

Delay: State of Charge is delayed for the amount of time stored in VALUE (0 to 24 hours).
Time of Day: Charge will not start until the time of day is stored in VALUE (24-hour format).

Daily Charge
ON/OFF – Sets daily charge ON or OFF.
Daily Chg Start – Sets daily charge start time.
Daily Chg End – Sets daily charge end time.

Block-Out Charge
ON/OFF – Sets block-out charge ON or OFF.
Block-Out Start – Sets daily charge start time.
Block-Out End – Sets daily charge end time.

Floating Load
ON/OFF – Sets float mode ON or OFF.
Current – Sets float current.
Voltage – Sets float voltage.

Charge (cont.)

This feature can be turned on or off depending on the application. A float charge at the end of the standard charge is intended to compensate for consumption by the truck electronics that are left on when the truck is not used (typically AGV). The parameter VOLTAGE in mVpc (millivolts per cell) determines the maximum float voltage. The parameter CURRENT defines the current output during the float. The current will automatically decrease to keep the battery voltage at the maximum defined by the VOLTAGE parameter.

Conditional Charge
Sets conditional charge %.

The charger will only commence the charge if the battery has reached the limit of **Depth of Discharge** (DoD) of more than x%. For example, if the user wants to charge the battery only if it is discharged more than 30%, the parameter 30 has to be entered in the conditional charge. The 0 value disables the function.

Battery Rest
Set battery rest time in hours.

Cold Pulse
Sets cold pulses ON or OFF. Only can use with a high level password.

CF Flooded
Only can use with a high level password.

Refresh ON/OFF
Sets refresh mode ON or OFF.

Imax
Sets charger maximum output current.

Fast Param
Allows setting of parameters specific to fast charging.

Istart: Allows setting max start rate of either 40% or 50% of battery capacity.

Vreg: Allows setting the regulation voltage in phase 2.

⚠ CAUTION Changing from factory default will affect charge time and could overheat battery if adjusted incorrectly.

Finish Charge Time: Allows setting the amount of time the charger remains at 4.5% of battery capacity for the first phase of the equalize process.

Battery

NB Cells
Sets number of battery cells: Auto, 12, 18, 24, 30, 32, 36, and 40 Cell.

Cap Manu/Auto
Set in Auto for IONIC profile; all other profiles should be set in Manual.

Capacity
Without BBWC device: Charger uses programmed capacity for all profiles except IONIC; in IONIC, charger automatically calculates Ah capacity.
With BBWC device: Charger uses BBWC capacity for all charge profiles.

Battery Temperature
This parameter adjusts the regulation voltages on the charging profile – values from 5°F (-15°C) to 149°F (65°C).

Without BBWC device: Defines the average operating battery temperature before the charge. It is recommended the average electrolyte temperature be entered, especially in cold areas.

With BBWC device: The battery operating temperature will be automatically transmitted from BBWC device. The battery temperature will be analyzed during the charge; if it increases too much, the charger will stop to prevent any possible damage.

High Temperature
Defines a battery temperature safety limit.

Without BBWC device: Not used.

With BBWC device:
If the battery temperature, during the charge, reaches the programmed limit, the charger will stop the charge and wait until the temperature decreases.

CABLE AND EQUALIZATION

Cable

Length
Select the length of DC cables from the charger to the battery terminals in one-foot increments, from three to 50 feet.

Section
Sets the DC cable gauge. Selections are 4, 1/0, 2/0, and 3/0 (AWG).

Equalization

Manu Current
This defines the equalization or desulphation current for a manual start.

Time
Sets the equalization time from one to 48 hours.

Delayed Start (Delay)
Sets the delay between the normal charge and the equalization charge from zero to 23 hours.

Frequency
Selects one or several periods for carrying out the equalization charge. The user can select one or several days per week.

Idle ON/OFF
Required for CEC Compliance (CA & OR).

Options

Options Test
Turns on Battery Status (Red/Green) and electrovalve output briefly to test operation.

Electrovalve Time
Sets time ON in seconds.

PLC Pulse ON/OFF
When interfacing a charger with a PLC controller, pulse charging can either be enabled or disabled. When enabled, the charge profile is similar to IONIC charge profile.

RFI IQ ON/OFF

Turns IQ communications ON or OFF.

RST Memo/Status
Always set to yes.

Network

Protocol
Sets a protocol to Jbus, LAN, or BFM.

Baud Rate
Sets baud rate.

JBUS-Address
Sets address.

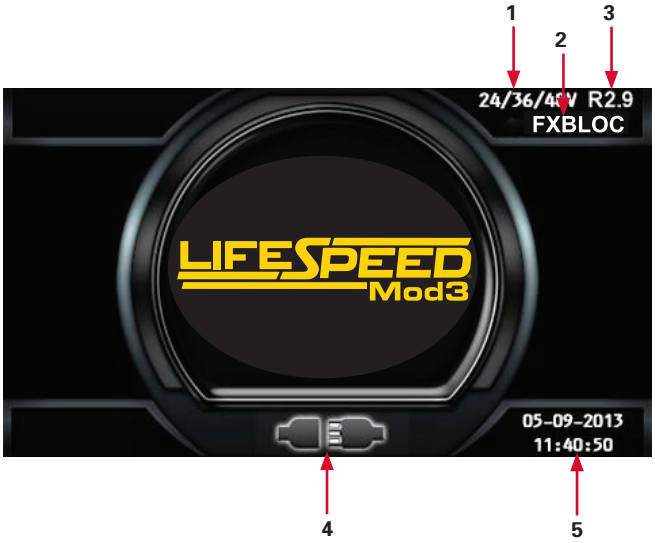
Ethernet
IP address, DNS, Gateway, and subnet mask.

WIFI
SSID1, SSID2, Security, Pass Phase 1, and Pass Phase 2.

Charging the Battery

At this point, the charger should have been set up by a qualified service technician. Charging can only begin when a battery of the proper type, capacity, and voltage is connected to the charger.
With the charger in wait mode (no battery connected) and without pressing the enter/stop and start button, the display will show the following information:

Ref	Description
1	Charger DC Voltage
2	Selected Charge Profile
3	Firmware Version
4	Connect Battery
5	System Time and Date



Charger Idle Display

Starting a Charge Cycle
The charger will start automatically when a battery is connected or push the enter/stop and start button if the battery is already connected.

Delayed Start
If the charger was programmed for a delayed start, charging will begin following that delay. When the battery is plugged into the charger, the display shows the time remaining before the programmed charging starts.

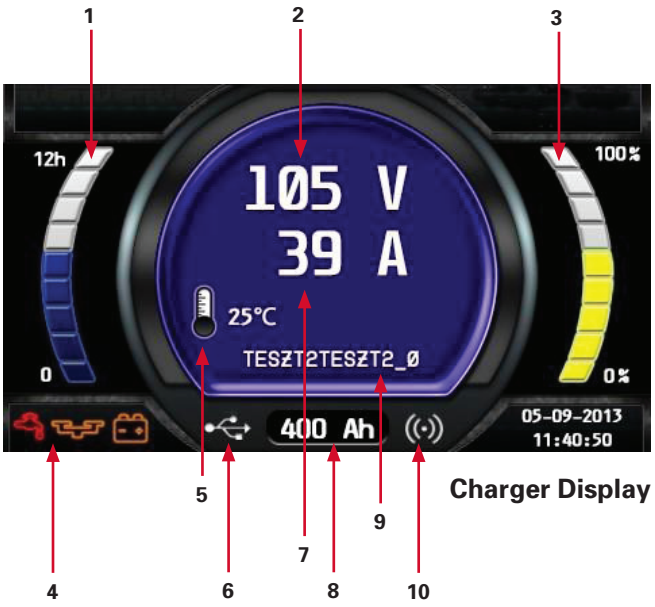
Countdown Display
Without a BBWC Device: If the BBWC device adapter is not enabled or no BBWC devices are in range, effective charging starts after the programmed delay. The charger uses Profile, Capacity, and Temperature settings programmed in the Configuration menu.
With a BBWC Device: If a BBWC device adapter is present and one or more BBWC device is in range, the charger will turn on and apply current to the battery. The display will show "SCAN" followed by "IQLINK". This routine determines which BBWC device in range the battery charger is connected to. Once the charger makes the determination, it downloads data from BBWC device, displays the battery S/N, updates the profile capacity and temperature for charging, and starts the main charge.

Countdown Display

Charging the Battery (cont.)

A few moments into the effective charge, the display will begin alternating between the following charging information:

Ref	Description
1	Charge Time
2	Charge Voltage (total V and V/c)
3	Percent of Charge
4	BBWC Device Warnings
5	Battery Temperature, Alternates with Ah Returned
6	USB Connection
7	Charge Current
8	Battery Capacity
9	Battery S/N from BBWC Device
10	BBWC Device Link



Charger Display

End of Charge without Equalization
The green charge complete LED comes on after the proper end of charge. The green charge complete LED is on and the display shows AVAIL. The display alternates between:

- Total charging time
- Amp-hours restored to the battery

Any other lit LED indicates a problem during charging. Please refer to the Control Panel Features section for more information.

End of Charge Display

If the battery remains plugged in and a refresh charge has been enabled, refreshes will occur to maintain an optimal charge.

The battery is now ready for use. Push the ON/OFF button before unplugging the battery.

End of Charge with Equalization
An equalize charge can be started manually or automatically.

Manual Equalization Start

1. At the end of the charge (green LED on or flashing), press the <EQUALIZE> button. The equalize button can also be pressed any time during the charge and an equalize charge will be started after charging is complete.
   NOTE: When an equalize charge is manually started, the output current will be set to the value saved in the charger configuration.
2. The start of the equalization charge is indicated by the symbol ⎍⎍⎍. During the equalization charge, the charger displays the output current and alternates, the battery voltage and voltage per cell, and the remaining time.
3. The battery will be available when the green LED comes back on and the display shows AVAIL.
4. The battery is now ready for use. If the battery remains plugged in and refresh charge has been enabled, refreshes will occur to maintain an optimal charge. Push the ON/OFF button before unplugging the battery.

Automatic Equalization Start
If an equalization day has been programmed in Charger configurations the equalization charge will start automatically on the programmed day of the week after charging is complete.

Charging the Battery (cont.)

The battery will be available when the green LED comes back on and the display shows AVAIL. The battery is now ready for use. If the battery remains plugged in and a refresh charge has been enabled, refreshes will occur to maintain an optimal charge. Push the ON/OFF button before unplugging the battery.

Technical Specifications

For LS3 models 208/220/240V:

Model Number	AC Input				DC Output			Opportunity Capacity Range (Ah)	2hr Fast Capacity Range (Ah)	3hr Fast Capacity Range (Ah)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules / # Bays	Cells	Max Current (A)							
LS3-48F-200G	208/220/240	37/35/32	44.4	3	5/6	12 18 24	200	100 - 800	100 - 400	100 - 600	19.2 x 13.8 x 21.4	3/0	F	102
LS3-48F-240G	208/220/240	44.4/42/38.4	44.4	3	6/6	12 18 24	240	100 - 960	100 - 480	100 - 720	19.2 x 13.8 x 21.4	3/0	F	110
LS3-48H-280G	208/220/240	51.8/49/44.8	59.2	3	7/8	12 18 24	280	100 - 1120	100 - 560	100 - 840	20 x 15.9 x 37.8	3/0	H	115
LS3-48H-320G	208/220/240	59.2/56/51.2	59.2	3	8/8	12 18 24	320	100 - 1280	100 - 640	100 - 960	20 x 15.9 x 37.8	3/0	H	123
LS3-80F-280G	208/220/240	38.5/36.5/33.5	46.2	3	5/6	12 18 24	280	100 - 1120	100 - 560	100 - 840	20 x 15.9 x 37.8	3/0	F	115
LS3-80F-320G	208/220/240	46.2/43.8/40.2	46.2	3	6/6	12 18 24	320	100 - 1280	100 - 640	100 - 960	20 x 15.9 x 37.8	3/0	F	123
LS3-80H-280G	208/220/240	53.9/51.1/46.9	59.2	3	7/8	12 18 24	280	100 - 1120	100 - 560	100 - 840	20 x 15.9 x 37.8	3/0	H	115
LS3-80H-320G	208/220/240	61.6/58.4/53.6	59.2	3	8/8	12 18 24	320	100 - 1280	100 - 640	100 - 960	20 x 15.9 x 37.8	3/0	H	123

For LS3 models 440V:

Model Number	AC Input				DC Output			Opportunity Capacity Range (Ah)	2hr Fast Capacity Range (Ah)	3hr Fast Capacity Range (Ah)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules / # Bays	Cells	Max Current (A)							
LS3-48D-60H	480	4.8	19.2	3	1/4	12 18 24	70 65 60	100 - 280 100 - 260 100 - 240	100 - 140 100 - 140 100 - 130	100 - 210 100 - 195 100 - 180	13.30 x 13.70 x 19.9	3/0	D	86
LS3-48D-120H	480	9.6	19.2	3	2/4	12 18 24	140 130 120	100 - 560 100 - 520 100 - 480	100 - 280 100 - 260 100 - 240	100 - 420 100 - 390 100 - 360	13.30 x 13.70 x 19.9	3/0	D	94
LS3-48D-180H	480	14.4	19.2	3	3/4	12 18 24	210 195 180	100 - 840 100 - 780 100 - 720	100 - 420 100 - 390 100 - 360	100 - 630 100 - 585 100 - 540	13.30 x 13.70 x 19.9	3/0	D	86
LS3-48D-240H	480	19.2	19.2	3	4/4	12 18 24	280 260 240	100 - 1120 100 - 1040 100 - 960	100 - 560 100 - 520 100 - 480	100 - 840 100 - 780 100 - 720	13.30 x 13.70 x 19.9	3/0	D	94
LS3-48F-180H	480	14.4	28.8	3	3/6	12 18 24	210 195 180	100 - 840 100 - 780 100 - 720	100 - 420 100 - 390 100 - 360	100 - 630 100 - 585 100 - 540	19.2 x 13.8 x 21.40	3/0	F	86
LS3-48F-240H	480	19.2	28.8	3	4/6	12 18 24	280 260 240	100 - 1120 100 - 1040 100 - 960	100 - 560 100 - 520 100 - 480	100 - 840 100 - 780 100 - 720	19.2 x 13.8 x 21.40	3/0	F	94
LS3-48F-300H	480	24.0	28.8	3	5/6	12 18 24	320 320 300	100 - 1280 100 - 1280 100 - 1200	100 - 640 100 - 640 100 - 600	100 - 960 100 - 960 100 - 900	19.2 x 13.8 x 21.40	3/0	F	102
LS3-48F-320H	480	28.8	28.8	3	6/6	12 18 24	320 320 320	100 - 1280 100 - 1280 100 - 1280	100 - 640 100 - 640 100 - 640	100 - 960 100 - 960 100 - 960	19.2 x 13.8 x 21.40	3/0	F	110
LS3-48F-300HP	480	24.0	28.8	3	5/6	12 18 24	350 325 300	100 - 1400 100 - 1300 100 - 1200	100 - 700 100 - 650 100 - 600	100 - 1050 100 - 975 100 - 900	19.2 x 13.8 x 21.40	Dual 3/0	F	115

TECHNICAL SPECIFICATIONS

Technical Specifications (cont.)

Model Number	AC Input				DC Output			Opportunity Capacity Range (Ah)	2hr Fast Capacity Range (Ah)	3hr Fast Capacity Range (Ah)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules / # Bays	Cells	Max Current (A)							
LS3-48F-360HP	480	28.8	28.8	3	6/6	12	420	100 - 1680	100 - 840	100 - 1260	19.2 x 13.8 x 21.40	Dual 3/0	F	123
						18	390	100 - 1560	100 - 780	100 - 1170				
						24	360	100 - 1440	100 - 720	100 - 1080				
LS3-48H-420HP	480	33.6	38.4	3	7/8	12	490	100 - 1960	100 - 1080	100 - 1470	20 x 15.9 x 37.8	Dual 3/0	H	115
						18	455	100 - 1820	100 - 910	100 - 1365				
						24	420	100 - 1680	100 - 840	100 - 1260				
LS3-48H-480HP	480	38.4	38.4	3	8/8	12	560	100 - 2240	100 - 1120	100 - 1680	20 x 15.9 x 37.8	Dual 3/0	H	123
						18	520	100 - 2080	100 - 1040	100 - 1560				
						24	480	100 - 1920	100 - 960	100 - 1440				
LS3-80D-36H	480	4.8	19.2	3	1/4	36	40	100 - 160	00 - 80	100 - 120	13.30 x 13.70 x 19.9	3/0	D	86
						40	36	100 - 144	0 - 72	100 - 108				
LS3-80D-72H	480	9.6	19.2	3	2/4	36	80	100 - 320	100 - 160	100 - 240	13.30 x 13.70 x 19.9	3/0	D	94
						40	72	100 - 288	100 - 144	100 - 216				
LS3-80D-108H	480	14.4	19.2	3	3/4	36	120	100 - 432	100 - 240	100 - 360	13.30 x 13.70 x 19.9	3/0	D	86
						40	108	100 - 430	100 - 216	100 - 324				
LS3-80D-144H	480	19.2	19.2	3	4/4	36	160	100 - 640	100 - 320	100 - 480	13.30 x 13.70 x 19.9	3/0	D	94
						40	144	100 - 575	100 - 288	100 - 432				
LS3-80F-108H	480	14.4	28.8	3	3/6	36	120	100 - 480	100 - 240	100 - 360	19.2 x 13.8 x 21.40	3/0	F	86
						40	108	100 - 430	100 - 215	100 - 324				
LS3-80F-144H	480	19.2	28.8	3	4/6	36	160	100 - 640	100 - 320	100 - 480	19.2 x 13.8 x 21.40	3/0	F	94
						40	144	100 - 575	100 - 285	100 - 432				
LS3-80F-180H	480	24.0	28.8	3	5/6	36	200	100 - 800	100 - 400	100 - 600	19.2 x 13.8 x 21.40	3/0	F	102
						40	180	100 - 720	100 - 360	100 - 540				
LS3-80F-216H	480	28.8	28.8	3	6/6	36	240	100 - 960	100 - 480	100 - 720	19.2 x 13.8 x 21.40	3/0	F	110
						40	216	100 - 865	100 - 430	100 - 648				
LS3-80H-252H	480	33.6	38.4	3	7/8	36	280	100-1120	100 - 560	100 - 840	20 x 15.9 x 37.8	3/0	H	210
						40	252	100-1080	100 - 504	100 - 756				
LS3-80H-288H	480	38.4	38.4	3	8/8	36	320	100-1280	100 - 640	100 - 960	20 x 15.9 x 37.8	3/0	H	218
						40	288	100-1152	100 - 576	100 - 864				

For LS3 models 480V:

Model Number	AC Input				DC Output			Opportunity Capacity Range (Ah)	2hr Fast Capacity Range (Ah)	3hr Fast Capacity Range (Ah)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules / # Bays	Cells	Max Current (A)							
LS3-48D-60Y	480	4.8	19.2	3	1/4	12	80	100 - 320	100 - 160	100 - 240	13.30 x 13.70 x 19.9	3/0	D	86
						18	80	100 - 320	100 - 160	100 - 240				
						24	60	100 - 150	100 - 120	100 - 180				
LS3-48D-120Y	480	9.6	19.2	3	2/4	12	160	100 - 640	100 - 320	100 - 480	13.30 x 13.70 x 19.9	3/0	D	94
						18	160	100 - 640	100 - 320	100 - 480				
						24	120	100 - 480	100 - 240	100 - 360				
LS3-48D-180Y	480	14.4	19.2	3	3/4	12	240	100 - 960	100 - 480	100 - 720	13.30 x 13.70 x 19.9	3/0	D	86
						18	240	100 - 960	100 - 480	100 - 720				
						24	180	100 - 720	100 - 360	100 - 540				
LS3-48D-240Y	480	19.2	19.2	3	4/4	12	320	100 - 1280	100 - 640	100 - 960	13.30 x 13.70 x 19.9	3/0	D	94
						18	320	100 - 1280	100 - 640	100 - 960				
						24	240	100 - 960	100 - 480	100 - 720				
LS3-48F-180Y	480	14.4	28.8	3	3/6	12	240	100 - 960	100 - 480	100 - 720	19.2 x 13.8 x 21.40	3/0	F	86
						18	240	100 - 960	100 - 480	100 - 720				
						24	180	100 - 720	100 - 360	100 - 540				
LS3-48F-240Y	480	19.2	28.8	3	4/6	12	320	100 - 1280	100 - 640	100 - 960	19.2 x 13.8 x 21.40	3/0	F	94
						18	320	100 - 1280	100 - 640	100 - 960				
						24	240	100 - 960	100 - 480	100 - 720				
LS3-48F-300Y	480	24.0	28.8	3	5/6	12	320	100 - 1280	100 - 640	100 - 960	19.2 x 13.8 x 21.40	3/0	F	102
						18	320	100 - 1280	100 - 640	100 - 960				
						24	300	100 - 1200	100 - 600	100 - 900				
LS3-48F-320Y	480	28.8	28.8	3	6/6	12	320	100 - 1280	100 - 640	100 - 960	19.2 x 13.8 x 21.40	3/0	F	110
						18	320	100 - 1280	100 - 640	100 - 960				
						24	320	100 - 1280	100 - 640	100 - 960				
LS3-48F-300YP	480	24.0	28.8	3	5/6	12	400	100 - 1600	100 - 800	100 - 1200	19.2 x 13.8 x 21.40	Dual 3/0	F	115
						18	400	100 - 1600	100 - 800	100 - 1200				
						24	300	100 - 1200	100 - 600	100 - 900				
LS3-48F-360YP	480	28.8	28.8	3	6/6	12	480	100 - 1920	100 - 960	100 - 1440	19.2 x 13.8 x 21.40	Dual 3/0	F	123
						18	480	100 - 1920	100 - 960	100 - 1440				
						24	360	100 - 1440	100 - 720	100 - 1080				
LS3-48H-420YP	480	33.6	38.4	3	7/8	12	560	100 - 2240	100 - 1120	100 - 1680	20 x 15.9 x 37.8	Dual 3/0	H	115
						18	560	100 - 2240	100 - 1120	100 - 1680				
						24	420	100 - 1680	100 - 840	100 - 1260				
LS3-48H-480YP	480	38.4	38.4	3	8/8	12	640	100 - 2560	100 - 1280	100 - 1920	20 x 15.9 x 37.8	Dual 3/0	H	123
						18	640	100 - 2560	100 - 1280	100 - 1920				
						24	480	100 - 1920	100 - 960	100 - 1440				
LS3-80D-36Y	480	4.8	19.2	3	1/4	36	40	100 - 160	0 - 80	100 - 120	13.30 x 13.70 x 19.9	3/0	D	86
						40	36	100 - 144	0 - 72	100 - 108				
LS3-80D-72Y	480	9.6	19.2	3	2/4	36	80	100 - 320	100 - 160	100 - 240	13.30 x 13.70 x 19.9	3/0	D	94
						40	72	100 - 288	100 - 144	100 - 216				
LS3-80D-108Y	480	14.4	19.2	3	3/4	36	120	100 - 432	100 - 240	100 - 360	13.30 x 13.70 x 19.9	3/0	D	86
						40	108	100 - 430	100 - 216	100 - 324				
LS3-80D-144Y	480	19.2	19.2	3	4/4	36	160	100 - 640	100 - 320	100 - 480	13.30 x 13.70 x 19.9	3/0	D	94
						40	144	100 - 575	100 - 288	100 - 432				
LS3-80F-108Y	480	14.4	28.8	3	3/6	36	120	100 - 480	100 - 240	100 - 360	19.2 x 13.8 x 21.40	3/0	F	86
						40	108	100 - 430	100 - 215	100 - 324				
LS3-80F-144Y	480	19.2	28.8	3	4/6	36	160	100 - 640	100 - 320	100 - 480	19.2 x 13.8 x 21.40	3/0	F	94
						40	144	100 - 575	100 - 285	100 - 432				
LS3-80F-180Y	480	24.0	28.8	3	5/6	36	200	100 - 800	100 - 400	100 - 600	19.2 x 13.8 x 21.40	3/0	F	102
						40	180	100 - 720	100 - 360	100 - 540				
LS3-80F-216Y	480	28.8	28.8	3	6/6	36	240	100 - 960	100 - 480	100 - 720	19.2 x 13.8 x 21.40	3/0	F	110
						40	216	100 - 865	100 - 430	100 - 648				
LS3-80H-252Y	480	33.6	38.4	3	7/8	36	280	100 - 1120	100 - 560	100 - 840	20 x 15.9 x 37.8	3/0	H	210
						40	252	100 - 1080	100 - 504	100 - 756				
LS3-80H-288Y	480	38.4	38.4	3	8/8	36	320	100 - 1280	100 - 640	100 - 960	20 x 15.9 x 37.8	3/0	H	218
						40	288	100 - 1152	100 - 576	100 - 864				

Technical Specifications (cont.)

For LS3 models 600V:

Model Number	AC Input				DC Output			Opportunity Capacity Range (Ah)	2hr Fast Capacity Range (Ah)	3hr Fast Capacity Range (Ah)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules / # Bays	Cells	Max Current (A)							
LS3-48D-60C	480	4.8	19.2	3	1/4	12	80	100 - 320	100 - 160	100 - 240	13.30 x 13.70 x 19.9	3/0	D	86
						18	80	100 - 320	100 - 160	100 - 240				
						24	60	100 - 150	100 - 120	100 - 180				
LS3-48D-120C	480	9.6	19.2	3	2/4	12	160	100 - 640	100 - 320	100 - 480	13.30 x 13.70 x 19.9	3/0	D	94
						18	160	100 - 640	100 - 320	100 - 480				
						24	120	100 - 480	100 - 240	100 - 360				
LS3-48D-180C	480	14.4	19.2	3	3/4	12	240	100 - 960	100 - 480	100 - 720	13.30 x 13.70 x 19.9	3/0	D	86
						18	240	100 - 960	100 - 480	100 - 720				
						24	180	100 - 720	100 - 360	100 - 540				
LS3-48D-240C	480	19.2	19.2	3	4/4	12	320	100 - 1280	100 - 640	100 - 960	13.30 x 13.70 x 19.9	3/0	D	94
						18	320	100 - 1280	100 - 640	100 - 960				
						24	240	100 - 960	100 - 480	100 - 720				
LS3-48F-180C	480	14.4	28.8	3	3/6	12	240	100 - 960	100 - 480	100 - 720	19.2 x 13.8 x 21.40	3/0	F	86
						18	240	100 - 960	100 - 480	100 - 720				
						24	180	100 - 720	100 - 360	100 - 540				
LS3-48F-240C	480	19.2	28.8	3	4/6	12	320	100 - 1280	100 - 640	100 - 960	19.2 x 13.8 x 21.40	3/0	F	94
						18	320	100 - 1280	100 - 640	100 - 960				
						24	240	100 - 960	100 - 480	100 - 720				
LS3-48F-300C	480	24.0	28.8	3	5/6	12	320	100 - 1280	100 - 640	100 - 960	19.2 x 13.8 x 21.40	3/0	F	102
						18	320	100 - 1280	100 - 640	100 - 960				
						24	300	100 - 1200	100 - 600	100 - 900				
LS3-48F-320C	480	28.8	28.8	3	6/6	12	320	100 - 1280	100 - 640	100 - 960	19.2 x 13.8 x 21.40	3/0	F	110
						18	320	100 - 1280	100 - 640	100 - 960				
						24	320	100 - 1280	100 - 640	100 - 960				
LS3-48F-300CP	480	24.0	28.8	3	5/6	12	400	100 - 1600	100 - 800	100 - 1200	19.2 x 13.8 x 21.40	Dual 3/0	F	115
						18	400	100 - 1600	100 - 800	100 - 1200				
						24	300	100 - 1200	100 - 600	100 - 900				
LS3-48F-360CP	480	28.8	28.8	3	6/6	12	480	100 - 1920	100 - 960	100 - 1440	19.2 x 13.8 x 21.40	Dual 3/0	F	123
						18	480	100 - 1920	100 - 960	100 - 1440				
						24	360	100 - 1440	100 - 720	100 - 1080				
LS3-48H-420CP	480	33.6	38.4	3	7/8	12	560	100 - 2240	100 - 1120	100 - 1680	20 x 15.9 x 37.8	Dual 3/0	H	115
						18	560	100 - 2240	100 - 1120	100 - 1680				
						24	420	100 - 1680	100 - 840	100 - 1260				
LS3-48H-480CP	480	38.4	38.4	3	8/8	12	640	100 - 2560	100 - 1280	100 - 1920	20 x 15.9 x 37.8	Dual 3/0	H	123
						18	640	100 - 2560	100 - 1280	100 - 1920				
						24	480	100 - 1920	100 - 960	100 - 1440				
LS3-80D-36C	480	4.8	19.2	3	1/4	36	40	100 - 160	0 - 80	100 - 120	13.30 x 13.70 x 19.9	3/0	D	86
						40	36	100 - 144	0 - 72	100 - 108				
LS3-80D-72C	480	9.6	19.2	3	2/4	36	80	100 - 320	100 - 160	100 - 240	13.30 x 13.70 x 19.9	3/0	D	94
						40	72	100 - 288	100 - 144	100 - 216				
LS3-80D-108C	480	14.4	19.2	3	3/4	36	120	100 - 432	100 - 240	100 - 360	13.30 x 13.70 x 19.9	3/0	D	86
						40	108	100 - 430	100 - 216	100 - 324				
LS3-80D-144C	480	19.2	19.2	3	4/4	36	160	100 - 640	100 - 320	100 - 480	13.30 x 13.70 x 19.9	3/0	D	94
						40	144	100 - 575	100 - 288	100 - 432				
LS3-80F-108C	480	14.4	28.8	3	3/6	36	120	100 - 480	100 - 240	100 - 360	19.2 x 13.8 x 21.40	3/0	F	86
						40	108	100 - 430	100 - 215	100 - 324				
LS3-80F-144C	480	19.2	28.8	3	4/6	36	160	100 - 640	100 - 320	100 - 480	19.2 x 13.8 x 21.40	3/0	F	94
						40	144	100 - 575	100 - 285	100 - 432				
LS3-80F-180C	480	24.0	28.8	3	5/6	36	200	100 - 800	100 - 400	100 - 600	19.2 x 13.8 x 21.40	3/0	F	102
						40	180	100 - 720	100 - 360	100 - 540				
LS3-80F-216C	480	28.8	28.8	3	6/6	36	240	100 - 960	100 - 480	100 - 720	19.2 x 13.8 x 21.40	3/0	F	110
						40	216	100 - 865	100 - 430	100 - 648				
LS3-80H-252C	480	33.6	38.4	3	7/8	36	280	100 - 1120	100 - 560	100 - 840	20 x 15.9 x 37.8	3/0	H	210
						40	252	100 - 1080	100 - 504	100 - 756				
LS3-80H-288C	480	38.4	38.4	3	8/8	36	320	100 - 1280	100 - 640	100 - 960	20 x 15.9 x 37.8	3/0	H	218
						40	288	100 - 1152	100 - 576	100 - 864				

Service and Troubleshooting

Fault Display

In case of a fault, one of the corresponding fault codes listed below will appear on the display. If it is a critical fault, charging will stop and the Red Fault LED will be illuminated.

Service and Troubleshooting (cont.)

Fault Codes

Fault	Critical	Cause	Solution
DF1	Yes	Low output current.	• Contact your HAWKER® service representative.
DF2	Yes	Output fault.	• Contact your HAWKER® service representative.
DF3	Yes	Incorrect battery.	• Contact your HAWKER® service representative.
DF4	No	The battery has been discharged more than 80% of its capacity.	• Contact your HAWKER® service representative.
DF5	No	Battery requires inspection.	• Contact your HAWKER® service representative.
DF7	No	Inspect battery.	• Contact your HAWKER® service representative.
TH or TH-Amb	Yes	Charger overheating.	• Contact your HAWKER® service representative.
BAT TEMP	Yes	Battery temperature reached maximum level.	• Allow the battery to cool down.
MOD TH	No	Alternating with charge parameters – one or more modules in thermal fault – the charging process continues – the fault module(s) is (are) displayed + Red Fault LED flashing.	• Contact your HAWKER® service representative.
DFMOD	No	Alternating with charge parameters – one or more modules in DF1 fault – the charging process continues – the fault module(s) is (are) displayed + Red Fault LED flashing.	• Contact your HAWKER® service representative.
DF ID	Yes	Blocking fault: one or more modules are not compatible with the charger configuration (for example 24 V charger with one 48 V module). This can happen if the user replaces one module with another one with a different voltage setting.	• Contact your HAWKER® service representative.
	No	Battery balance fault.	• Contact your HAWKER® service representative.

Maintenance and Service

⚠ WARNING THERE ARE DANGEROUS VOLTAGES WITHIN THE BATTERY CHARGER CABINET. ONLY A QUALIFIED PERSON SHOULD ATTEMPT TO ADJUST OR SERVICE THIS BATTERY CHARGER.

- The charger requires minimal maintenance. Connections and terminals should be kept clean and tight. The unit (especially the heatsink) should be periodically cleaned with low-pressure air to prevent any excessive dirt build up on components. Care should be taken not to bump or move any adjustments during cleaning. Make sure that both the AC lines and the battery are disconnected before cleaning. The frequency of this type of maintenance depends on the environment in which this unit is installed. For service, contact your local sales representative or call: 1-877-7HAWKER (USA & CANADA).

- Any data, descriptions, or specifications set forth herein are subject to change without notice. Before using the product(s), the user is advised and cautioned to make their own determination and assessment of the suitability of the product(s) for the specific use in question, and is further advised against relying on the information contained herein as it may relate to any general use or indistinct application. It is the ultimate responsibility of the user to ensure that the product is suited, and the information is applicable to the user's specific application. The product(s) featured herein will be used under conditions beyond the manufacturer's control and therefore all warranties, either express or implied, concerning the fitness or suitability of such product(s) for any particular use or in any specific application, are disclaimed. The user expressly assumes all risk and liability, whether based on contract, tort or otherwise, in connection with the use of the information contained herein or the product itself.

CHARGING SOLUTIONS

LIFESPEED® Mod3

HAWKER LIFESPEED® MOD3 BATTERY CHARGER WITH WIRELESS COMMUNICATIONS

Models: LSM3 and LSM3C (CEC)

OWNER'S MANUAL

IMPORTANT: Read and understand your owner's manual before installing, operating, or servicing this product.
DO NOT DESTROY THIS BOOK.

HAWKER®

www.hawkerpowersource.com

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CONTENTS

CONTENTS

CONTENTS

INTRODUCTION

LIFESPEED® Mod3

The information contained in this document is critical for safe handling and proper use of the HAWKER LIFESPEED® MOD3 chargers. It contains a global system specification as well as related safety measures, codes of behavior, a guideline for commissioning, and recommended maintenance. This document must be retained and available for users working with and responsible for the charger. All users are responsible for ensuring that all applications of the system are appropriate and safe, based on conditions anticipated or encountered during operation.

This owner's manual contains important safety instructions. Read and understand the sections on safety and operation of the charger before operating the charger and the equipment into which it is installed.

It is the owner's responsibility to ensure the use of the documentation and any activities related thereto, and to follow all legal requirements applicable to themselves and the applications in the respective countries.

This owner's manual is not intended to substitute for any training on handling and operating the industrial truck or HAWKER LIFESPEED® MOD3 chargers that may be required by local laws and/or industry standards. Proper instruction and training of all users must be ensured prior to any contact with the charger system.

Refer to page 45 for Terms and Abbreviations.

For service, contact your sales representative or call:
1-877-7HAWKER (USA and Canada)
www.hawkerpowersource.com

Your Safety and the Safety of Others is Very Important

⚠ WARNING You can be killed or seriously injured if you don't follow instructions.

SAFETY INSTRUCTIONS

Important Safety Instructions

⚠ WARNING THE SHIPPING PALLET MUST BE REMOVED FOR PROPER AND SAFE OPERATION.

1. This manual contains important safety and operating instructions. Before using the battery charger, read all instructions, cautions and warnings on the battery charger, the battery and the product using the battery.
2. This battery charger is designed to charge flooded and sealed lead-acid batteries. Read and understand all setup and operating instructions before using the battery charger to prevent damage to the battery and to the charger.
3. **Do not** touch non-insulated parts of the output connector or the battery terminals to prevent electrical shock.
4. During charge, batteries produce hydrogen gas, which can explode if ignited. Never smoke, use an open flame, or create sparks in the vicinity of the battery. Ventilate well when the battery is in an enclosed space.
5. **Do not** connect or disconnect the battery plug while the battery is charging. Doing so will cause arcing and burning of the connector resulting in charger damage or battery explosion.
6. Lead-acid batteries contain sulfuric acid, which causes burns. **Do not** get in eyes, on skin, or on clothing. In cases of contact with eyes, flush immediately with clean water for 15 minutes. Seek medical attention immediately.
7. Only factory qualified personnel can service this equipment. De-energize all AC and DC power connections before servicing the charger.
8. The charger is **not** for outdoor use.
9. Do not expose the charger to moisture. Operating **conditions** should be 32° to 113°F (0° to 45°C); 0 to 70% relative humidity.
10. Do not operate the charger if it has been dropped, received a sharp hit, or otherwise damaged in any way.
11. For continued protection and to reduce the risk of fire, install chargers on a floor of non-combustible material such as stone, brick, or grounded metal.

Technical Information

There are two nameplates located on the outside of the charger and should be used to check the application before installation. The main nameplate includes the UL model number and the ratings of the cabinet at its full capacity, while the “Configured Ratings” nameplate includes the part number and the ratings of the cabinet as configured. The Configured Ratings nameplate label must be replaced when adding or removing modules permanently in the field.

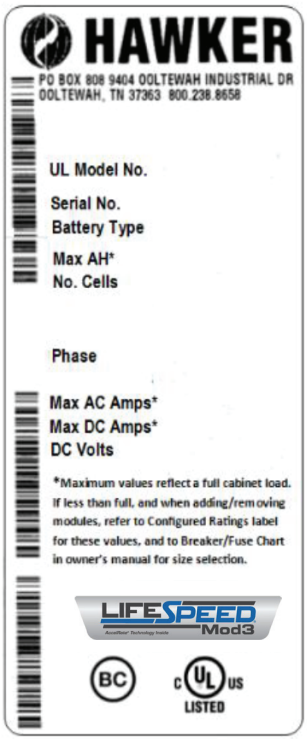
Part Number and UL Model Number

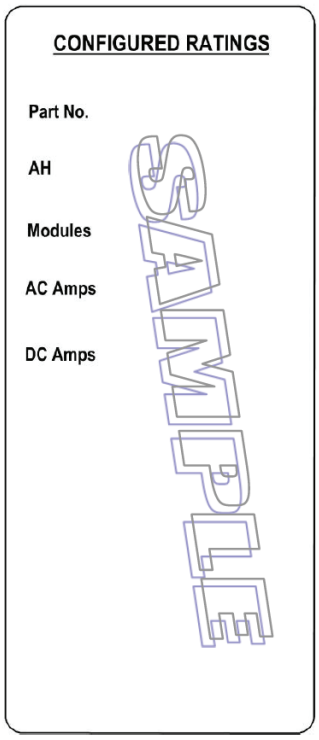
The UL model number specifies the characteristics of a full cabinet charger, while the part number specifies the characteristics of the cabinet as configured, plus all options. The part number is required in any discussion or correspondence regarding this unit.

Technical Information (cont.)

LSM3 - 48F - 240YR

- Model Type
- Phase
- (-) for Standard or (C) for CEC
- Max DC Volts
- Cabinet Size
- Max DC Current @ Max DC V
- Input Voltage Code
- Options





Technical Information (cont.)

Cabinet Size/Gauge Letter Codes

The following table describes the letter codes to be used in charger part numbers to indicate the number of slots and size of DC cables.

Letter Code	Module Positions	Standard Cable Gauge	Comments
F	6	3/0	Six slot, 3.5 kW cabinet
L	12	3/0	Twelve slot, 3.5 kW cabinet

AC Line Voltage Letter Codes

The following table describes the letter codes used in the charger part number to indicate the nominal AC line voltage(s) and frequency at which the charger is designed to operate.

Letter Code	Voltage(s) (Volts rms)	Line Frequency (Hertz)	Comments
C	600	50/60	600 VAC only
G	208/220/240	50/60	208/220/240 VAC only
H	440	50/60	440 VAC only
Y	480	50/60	480 VAC only

Specialty Charger Options List

Suffix	Description
1	15 Ft of DC cable
2	20 Ft of DC cable
3	25 Ft of DC cable
4	30 Ft of DC cable
E	LAN (Ethernet Compatible)
F	Red/Green Next Battery Capable – used in conjunction with BSI and BSS
R	Remote control capable (order remote control separately)
V	PLC capable

Technical Information (cont.)

Serial Number
This is the serial number that indicates complete information about the charger. It must be supplied with the part number on any correspondence or discussion regarding this charger.

Battery Type
The chemical content of the battery this charger is designed to charge: L-A = Lead-Acid.

Max Ah
This number indicates the maximum ampere-hour (Ah) capacity of this charger. Charging batteries of Ah capacities not specified here will cause the charger to deviate from the specifications.

No. Cells
This is the number of cells this charger is designed to charge.

Max Modules
This is the maximum number of power modules that can be installed into the charger cabinet.

Config Modules
This is the actual number of power modules installed in the charger cabinet.

Hertz
This is the frequency in cycles per second of the AC input voltage this charger is designed to operate on. Do not operate charger at a different frequency or from a generator with unstable frequency.

Phase
Number "3" indicates a three-phase charger; "1" indicates a single-phase charger.

AC Volts
This is the input voltage accommodated by this charger.
Failure to use the correct voltage will result in damage to the charger and/or the battery.
IMPORTANT: THE CHARGER WILL OPERATE ONLY ON NOMINAL AC LINE VOLTAGES INDICATED ON THE NAMEPLATE.

Config AC Amps
This is the AC current that this charger will draw with the number of power modules shown in Config Modules on the nameplate.

Max AC Amps
This is the maximum AC current this charger will draw from AC power. This charger must be connected to a branch circuit protection in accordance with the National Electrical Code NFPA70 and local codes. (AC breaker/fuse values can be found on a decal outside the charger.)

Max DC Amps
This is the maximum DC current that this charger cabinet will deliver to a discharged battery when fully populated with power modules.

DC Volts
This is the rated DC output voltage of the charger.

Config DC Amps
This is the DC current that this charger will deliver to a discharged battery with the originally furnished (Config Modules) number of power modules.

CEC
This logo is applied to chargers that are certified with the California Energy Commission in compliance with Appliance Efficiency Regulations:

cULus
This logo is applied to chargers that have been tested to applicable standards and requirements by Underwriters Laboratories (UL) and the Canadian Standards Association (CSA):

Installation

⚠ WARNING THE SHIPPING PALLET MUST BE REMOVED FOR PROPER AND SAFE OPERATION.

Location
For maximum trouble-free service, choose a location which is free of excess moisture, dust and corrosive fumes. Also, avoid locations where temperatures are high or where liquids will drip on the charger. Follow charger warning label when mounting on or over a combustible surface. Do not obstruct the ventilating openings.

Wall/Floor Mount Cabinet Chargers
The charger must be permanently mounted in a vertical position. The lower part of the charger must be at least 12 inches from the charger below if installed above another charger, and the upper part 12 inches from the ceiling. The distance between two chargers must be no less than 12 inches. Use the mounting kit supplied with the charger. See the Mounting Dimensions section at the end of this manual for proper wall and floor mounting.
NOTE: Ambient temperature at all levels cannot exceed 113°F (45°C).

Electrical Connections
To prevent failure of the charger, be sure it is connected to the correct line voltage.

⚠ WARNING MAKE SURE THE POWER TO THE CHARGER IS OFF AND THE BATTERY IS DISCONNECTED BEFORE CONNECTING THE INPUT POWER TO THE TERMINALS OF THE CHARGER.

Connecting Input Power
Connect the input power to the appropriate terminals, including ground. For screw type terminals, torque to 15 in.-lbs. Follow your local and National Electric Code in making these connections.

AC Circuit Protection
The user must provide suitable branch circuit protection and a disconnect method from the AC power supply to the charger to allow for safe servicing.

Breaker/Fuse Chart

AC Amps (A)	Breaker/Fuse size (A)
1–12	15
12.1–16	20
16.1–20	25
20.1–24	30
24.1–28	35
28.1–32	40
32.1–36	45
36.1–40	50
40.1–48	60
48.1–56	70
56.1–64	80
64.1–72	90
72.1–80	100
80.1–88	110
88.1–100	125

DC Plug Polarity
The charging cables are connected to the DC output of the charger with the red cable to the positive bus bar, and the black cable to the negative bus bar. The red cable is terminated into the "+" side of the battery connector, and the black cable is terminated into the "-" side of the connector. The output polarity of the charger must be observed when connecting to the battery. Improper connection will open the DC fuses in the power modules.

⚠ DANGER FAILURE TO GROUND THE CHARGER COULD LEAD TO FATAL ELECTRIC SHOCK. Follow local and National Electric Code for ground wire sizing.

Grounding the Charger
Connect incoming grounding conductor to the ground lug provided on the charger support panel. Torque the ground wire to 15 in.-lbs. This lug is marked as shown:

Description of Operation

General
The LIFESPEED® MOD3 series of chargers are compatible with batteries at 24, 36, 48, 72 or 80 volts, depending on model.
Battery recognition (voltage, capacity, state of charge, temperature, etc.) is accomplished by wireless communication from the BBWC device. Battery management is optimized through use of the BBWC device. Three charging profiles are available based on the configuration chosen by the operator. Furthermore, desulfation, equalization and compensation charges are integrated.

Auto Start Charge
When a battery is connected to the charger, the control board senses the voltage and after a 20 second delay, the charger starts charging the battery automatically.

Charging Current
Charging current is determined by the charger based on battery voltage and its state of charge. Charging current declines automatically as battery voltage rises during the charge. As the battery charges, the graphical LCD display will output various charge parameters including the charging current.

AC Power Fail
If the AC power fails with a battery connected to the charger during a charge cycle, the charger will reset and start a new charge cycle when power is restored. All charger settings as well as the time and date are preserved.

Series Charging
In series charging, the voltages of both batteries add up and must match the charger's nameplate rating. The charger's amp-hour rating must be equal to each of the battery's amp-hour rating. Charge cycle will not start unless both batteries are connected.

Glossary

Battery Boss™ WC (BBWC) Device
This is a compact wireless electronic device that is installed on the battery to provide real-time battery diagnostics. The device monitors the battery parameters such as capacity, temperature, voltage and state of charge, allowing the user to maximize battery performance and life.

Block-Out Time
This function prevents the charger from charging the battery during the block-out time window. If a charge cycle has started before the block-out window it is inhibited during the block-out window and will automatically restart the charge cycle at the end of the block-out window.

Charging Profile
The charging profile defines the rate of current charge over time. The charger adapts to the battery's condition and level of discharge.

Glossary (cont.)

Cold Storage
This is a charging profile that allows the configuration of the charger for use with batteries in cold storage application. The profile is an IEI (constant current, constant voltage, constant current) type with a number of user configurable parameters.

Equalization Charging
Equalization charging is performed after normal charging. It balances the electrolyte densities in the battery's cells.

Float Charge
A float charge at the end of standard charge is intended to compensate for consumption by the truck electronics that are left on when truck is not being operated.

IONIC Charging Profile
Also called "IONIC mixing", this type of charging profile consists of sending short pulses of current to stimulate gas formation in the active material, causing sulfuric acid to be distributed outside the plates. This system of mixing the electrolyte enables more rapid charging of flooded cell batteries subject to very high demands and balances out differences in density, homogenizing the electrolyte across the surface of the plates.

Opportunity Charging Profile
The OPP charge profile is used when opportunity charging is desired. It has a start rate of 25% of the battery's rated amp-hour capacity, requires one complete recharge in every 24 hours of service and must have an equalize charge done once a week which is programmed to run automatically.

Operation:
During opportunity charging the user can plug the battery in and charge it during breaks, lunch or any work stoppage time. One time per day the battery must receive a full standard IONIC recharge. The charger real time clock must be adjusted and set for this switch in charging profile to occur automatically at a predetermined time. Sufficient time should be scheduled after the full charge to allow the battery to completely cool to ambient temperatures before use.

NOTE: The user must configure the charger for the time of day that the full recharge is to take place, they must also configure the day of the week that the equalize charge will take place.

Fast Charging Profile
Utilizing a patented algorithm, the electronic circuits of the LIFESPEED® charger reduce the natural resistance of the battery by introducing short discharge cycles into the charging profile. This homogenization of the ions around the plates allows for a better distribution of the active ions in the charging zones. Therefore, a substantially larger current can be applied and sustained, resulting in a much faster charging process while maintaining full temperature control during the charge.

Refresh Charging
Refresh or maintenance charging enables the battery to be maintained at maximum charge all the time that it is connected to the charger. Refresh charge is applied at a predetermined intervals after charge is complete and battery remains connected to charger.

Terms and Abbreviations

Term/Abbreviation	Explanation/Description
Ah	Amp-Hour
AWG	American Wire Gauge
AVAIL	Available, battery is fully charged
BBWC	Battery Boss™ Wireless Connection
CEC	California Energy Commission
DoD	Depth of Discharge
GND	Ground
kW	Kilowatt
L-A	Lead-Acid
LCD	Liquid Crystal Display
LED	Light Emitting Diode
RFI	Radio Frequency Interface
TFT	Thin Film Transistor
USB	Universal Serial Bus

Operating Instructions

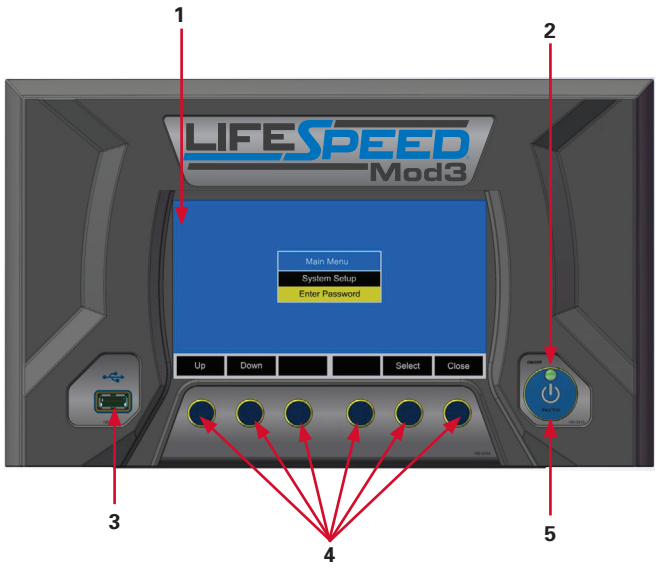
The HAWKER LIFESPEED® MOD3 series of chargers are compatible with batteries at 24, 36, 48, 72 or 80 volts (depending on the version supplied).

Battery recognition (voltage, capacity and state of charge) is accomplished automatically by the microprocessor. Several charging profiles are available (Fast, Opportunity, IONIC) based on the configuration chosen by the operator. Furthermore, equalization and compensation charges are integrated.

The HAWKER LIFESPEED® MOD3 charger includes an adapter to communicate to a BBWC device. The BBWC device is an advanced battery module that measures, tracks and stores important battery parameters such as temperature, electrolyte level, voltage and Ah throughput. This data is wirelessly transmitted to the HAWKER LIFESPEED® MOD3 charger to optimize charging, alert the operator to battery issues and safeguard the battery from being permanently damaged.

Control Panel

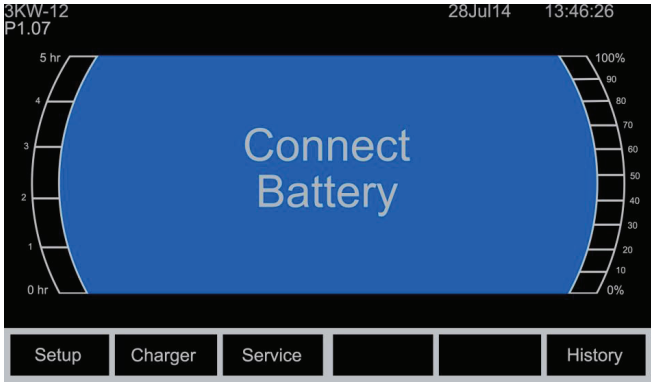
Ref	Function	Description
1	Graphical TFT LCD Display	Displays charger operation info and menus
2	LED indicator	Solid RED, fault indicator Blinking RED, charge stopped Solid YELLOW, charging Solid GREEN, charger idle Blinking GREEN, charge complete
3	USB port	Logs charge data, updates firmware and saves setup parameters
4	Navigation buttons	Each navigation button corresponds with the rectangle located directly above it
5	STOP and START button	Stop and restart battery charge



Menu Access

Idle Screen

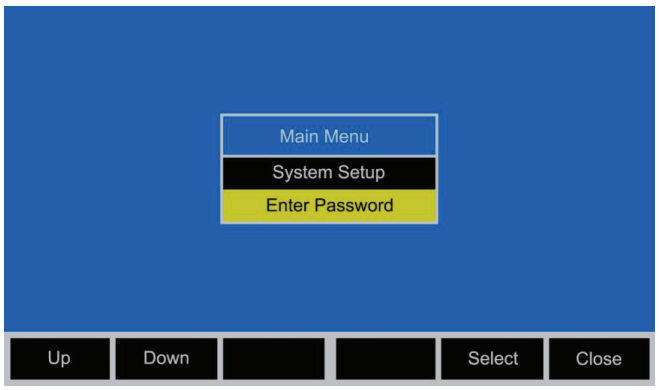
When the charger is idle, select Setup. The Main Menu is then displayed. The Main Menu is automatically exited after 120 seconds of inactivity or can be exited voluntarily by pressing the Close button.



Main Menu Display

All menus are accessed from Main Menu. The menus that require a password are not displayed until the correct password has been entered.

1. Select a menu option using the Up/Down navigation buttons.
2. Display the highlighted menu screen by pressing the Select navigation button.
3. Return to the Main Menu by pressing the Close button.
   - System Setup
   - Enter Password



System Setup

Date
Sets the date of the charger (MM/DD/YY).

Time
Sets the time of the charger (24 hr clock).

Daylight Savings Time
Enables or disables automatic clock adjustment for daylight savings time. When enabled, time will move ahead one hour at 02:00 on the second Sunday in March and will move back one hour at 02:00 on the first Sunday of November. The charger must be powered up at the time of the change for it to take affect.

Language
Selects the language displayed in the menus.

Displayed Units
Selects metric (EU) or imperial (US) units for temperature, length and size of DC cables.

Energy Saver
Enables or disables energy saver mode. When enabled, if the charger is left in idle mode for 5 minutes, the display backlight and power modules will shut off to save energy.

Display Brightness
Adjusts the brightness of the display screen.

Network
This can only be accessed by entering a password. If you don't know the password then a service technician will need to set this up.
Type: Wired, Wireless: Select network type
Charger IP Address: Enter address
Subnet Mask: Enter Subnet Mask
Gateway Address: Enter Gateway Address
Wireless Settings: Set SSID, Security, and Passphrase
Modbus: Enable or Disable Modbus
Transceiver Address: Enter address

Reset History
This can only be accessed by entering a password. If you don't know the password, then a service technician will need to clear history.
Select Yes to delete all history or No to exit without deleting history.

Enter Password

This is where the password is entered to gain access to service level menus by authorized HAWKER® service personnel only. Some of the items are accessible by all service personnel, others are only accessible through a higher level password controlled by the individual dealer's service manager.

1. Use the Up/Down buttons to select the correct alphanumeric character.
2. Use the Left/Right buttons to move the cursor either left or right.
3. Once the correct password is entered press the Select button.

If the correct password is entered, the display will automatically jump to the main menu with the service level menu displayed.

- System Setup
- Enter Password
- Change Password
- USB
- Charge Profile Configuration
- Constant Current Configuration
- Equalize Configuration
- Start Charge Configuration
- Post Charge Configuration
- Charger Configuration

PASSWORD AND USB

Change Password

This can only be accessed by entering the admin password. If you don't know the admin password then you will not be able to change any passwords.

Change Tech Password
Use this to change the main password

Change Admin Password
Use this to change the admin password

USB

History Data
Enables the storage of charge history data to a USB data storage device (e.g., memory stick, thumb drive). To save charge history data:

1. Insert the data storage device in the USB port on the front of the charger.
2. Go to Setup->USB->History Data.
3. Select Filter History Data and set the number of days (30, 60, 90, 180, 360, All) Defaults to all if no filter is selected.
4. Select Save Memo History Data to create a file to save history memo data. Default filename is the charger serial number. Use the Up/Down buttons to change the alphanumeric character and the Right/Left buttons to move the cursor. When you have entered the desired file name press save.
5. Remove data storage device from USB port. The file, in CSV format will be stored in the data storage device.

Save Setup Parameters
Enables the storage of the charger Setup Parameters to a USB data storage device (e.g., memory stick, thumb drive).

Load Setup Parameters
Enables the uploading of the charger Setup Parameters from a USB data storage device (e.g., memory stick, thumb drive).

Load Control Firmware
Enables the updating of the charger's internal firmware. Firmware updates will be provided by HAWKER®.

Load Module Firmware
Enables the updating of the power modules' internal firmware. Firmware updates will be provided by HAWKER®.

Charge Profile Configuration

Battery Capacity
Without BBWC Device: this adjusts the battery Ah capacity used by the charger to determine start and finish rates, and should match the Ah capacity of the battery being charged.
With BBWC Device: the battery Ah capacity will be automatically transmitted from the BBWC device.

When running in IONIC: If using IONIC with Auto Capacity is enabled, the value is not used and it automatically calculates the Ah capacity of the battery. If using IONIC charging profile and Auto Capacity is disabled, the charger will use this for the Ah capacity of the battery.

Charge Profile Configuration (cont.)

Auto Capacity
Select either Disable or Enable. Only used for IONIC charging profile. All other profiles are manual all the time and will either use the battery Ah programmed into Battery Capacity or the value the charger reads from the BBWC device. When enabled in IONIC charging profile the charger will automatically adjust to battery Ah sizes within the range it covers. (depending on number of modules installed).

Battery Temperature
This parameter adjusts the regulation voltages on the charging profile (values between 5° and 149°F (–15° and 65°C).
Without BBWC Device: defines the average operating battery temperature before the charge. It is recommended the average electrolyte temperature be entered, especially in cold areas.
With BBWC Device: the battery operating temperature will be automatically transmitted from the BBWC device. The battery temperature will be analyzed during the charge; if it increases too much, the charger will stop to prevent any possible damage.

High Battery Temperature
Defines a battery temperature safety limit.
Without BBWC Device: not used.
With BBWC Device: If the battery temperature, during the charge, reaches the programmed limit, the charger will stop the charge cycle and wait until the temperature decreases.

Restart Temperature
Without BBWC Device: not used.
With BBWC Device: Defines the temperature at which the charge will restart, if the programmed limit is reached, and the charge stops.

Charge Profile
Select Fast, Opportunity, or IONIC. This setting will be overridden by the BBWC device programming so make sure the BBWC device is set to tell the charger the profile you desire the charger to run.

IONIC Charge Coefficient
This is only accessible through high level password.
If you do have access to this setting, make sure you understand what you are doing. If adjusted incorrectly it could eventually damage a battery if not corrected.
This is the amount of overcharge built into the IONIC charge profile to compensate for losses in the battery during recharge. (factory-set to 15%, for a total of 115%).

AGV Offset
For AGV applications, enter amount of amps onboard electronics draw during charging. Allowed range is 0 to 20A. Entering 0 disables the feature.

Constant Current Configuration

⚠ CAUTION This mode is for use by trained service technicians only. For instructions on use, see charger service manual.

Equalize Configuration

Equalize Days
Select day or days of the week to equalize the battery. You may select none, or as many days as you need.

Equalize Time
Equalize Time of Day: Sets the time of day the Equalize charge will start (24-hour clock).
Equalize Delay: Sets the delay between the normal charge and the equalization charge from 0 to 24 hrs.

Equalize Duration
Sets the equalization time from 00:01 to 23:59 (hh:mm).

Start Charge Configuration

Charge Delay
Charge Delay Type:
- OFF (no delay)
- Charge Delay Time of Day
- Time After Battery Connect

Charge Delay On Days: Selects day or days of the week to delay charge. One or more days may be selected, or none.
Charge Delay Time of Day: Charge will not start until the time of day stored in VALUE (24-hour format) is reached.
Delay Time After Battery Connection: Start of charge is delayed by the amount of time stored in VALUE (0 to 24 hours).

Charge Block-Out
Block-Out Days: Selects day or days of the week to block out charge. One or more days may be selected, or none.
Block-Out Start Time: Sets block-out start time.
Block-Out End Time: Sets block-out end time.

Conditional Charge %
Set conditional charge %. The charger will only charge if the battery has reached the limit of depth of discharge (DoD) of more than x%. For example, if the user wants to charge the battery only if it is discharged more than 30%, the parameter 30 has to be entered in the conditional charge. The 0 value disables the function.

Opportunity Daily Charge
Start Daily Charge Time: Sets daily charge start time.
End Daily Charge Time: Sets daily charge end time.

Fast Voltage Regulation
This is only accessible through high level password. If you do have access to this setting, make sure you understand what you are doing. If adjusted incorrectly it could eventually damage a battery if not corrected.
Enter value between 2450 and 2750 in mVPC. Usually not necessary to change. Factory default is 2650.

Post-Charge Configuration

Cool-Down ON/OFF
Turns the cool-down ON or OFF.

Cool-Down Time
Sets the period of cool-down time.

Post-Charge Configuration (cont.)

Float ON/OFF
Turns Float ON or OFF.

Float Current
Used for AGVs that have a continuous amp draw for the onboard electronics. Use this feature to avoid a battery being discharged after main charge is completed (values allowed from 3A to 20A).

Refresh ON/OFF
Sets refresh mode to ON or OFF.
Once charging is complete, as long as the battery remains connected, refresh charging is automatically initiated to retain the battery's charge.

Charger Configuration

Cabinet Bay Size
This can only be accessed by entering higher-level password. Select 6-Bay or 12-Bay to match actual cabinet size.

Number of Modules
This can only be accessed by entering higher-level password. Enter number of modules installed in charger. Limited by the cabinet selected in Cabinet Bay Size.

Module Type
This can only be accessed by entering higher-level password. Select module type installed in charger. Either 24-36-48 or 72-80.

72/80 V Module Battery Voltage
Charger Out of Service: Leave this option selected if charging a 24/36/48 V battery. Select 72 V or 80 V if charging a 72 V or 80 V battery.

DC Cable Setup
DC Cable Length: Selects the length of DC cables from the charger to the battery terminals. UL-listed chargers require 6 ft minimum.
DC Cable Section: Sets the DC cable gauge. Selections #2, #1, 1/0, 2/0, 3/0, 4/0 AWG.

Charger Options
Options Selection: Choose Remote Switch/PLC or Battery Status Indicator.
If using one of these charger options, that option must be enabled. Remote Switch and PLC options can't be enabled at the same time.
I/O Test Inputs: Push button on remote and circle will turn yellow if operating correctly.
I/O Test Outputs: Used to test the functionality of each option. Use the up and down buttons to highlight the correct I/O test. Press the ON button to start the test and the OFF button to stop the test.

BBWC Device Communications
This can only be accessed by entering higher-level password.
Select Disable or Enable. When disabled then there is no BBWC device communications even if the battery has a BBWC device.

Electrovalve
Electrovalve Enable/Disable: Enables or disables electrovalve option.
Electrovalve Duration: Sets the duration the electrovalve output will be on (0 to 480 seconds) after charge is complete.

Enter Charger Serial Number
If replacing an HMI/display assembly, the charger serial number will need to be added. Used when saving memos for keeping track of data.

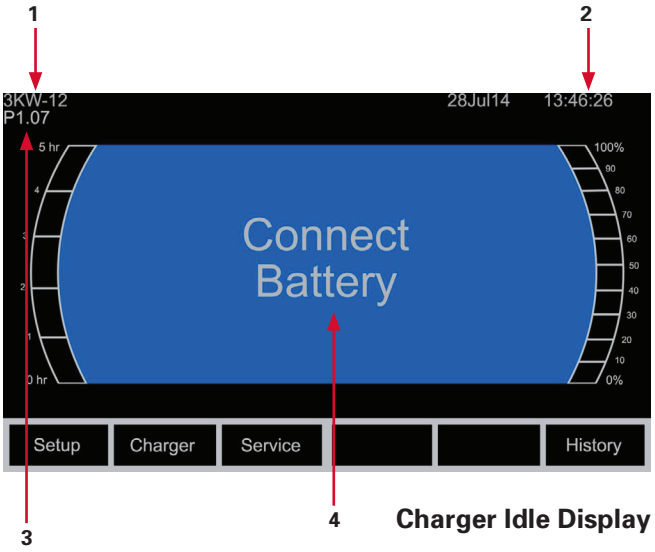
Customer Asset Number
Enter customer asset number. Used when saving memos for keeping track of data.

Notice Regarding Cold Profile:
There is not a selectable profile for Cold. This is because the LIFESPEED® MOD3 charger will switch to the Cold profile automatically when using a BBWC device on the battery if the temperature is below 60°F. When not using a BBWC device, the user should program the actual battery temperature in the charger and it will run a Cold profile for the temperature programmed. Regulation voltage is temperature compensated so ideally cold storage applications would use a BBWC device.

Charging the Battery

Once the charger is set up by a qualified service person, charging begins when a battery of the proper type, capacity, and voltage is connected to the charger. While the charger is in idle mode (no battery connected), the display will show the following information:

Ref	Description
1	Charger Type
2	System Time and Date
3	Firmware Version
4	Connect Battery



Charger Idle Display

Starting a Charge Cycle
The charger will start automatically when a battery is connected, or by pushing the Stop/Start button if the battery is already connected.

Delayed Start
If the charger was programmed for delayed start, charging will begin following that delay. When the battery is plugged in to the charger, the display shows the time remaining before the programmed charging starts.

Countdown Without a Battery Boss™ WC device (BBWC)
If the BBWC adapter is not enabled or no BBWC devices are in range, effective charging starts after a 20 second countdown. The charger uses profile, capacity and temperature settings programmed in the Configuration menu.

With a BBWC device
If a BBWC device adapter is present and one or more BBWC device is in range, the charger will turn ON and apply current to the battery. The display will show "SCAN" followed by "LINK". This routine determines which BBWC device in range is on the battery the charger is connected to. Once the charger makes the determination it downloads data from BBWC device, displays the battery S/N, updates the profile, capacity and temperature for charging and starts the main charge.

How it connects to a BBWC Scanning – Scanning for BBWC devices. This state is collecting addresses of any BBWC devices within the adapter's range. If any addresses are successfully collected, the next state is syncing (see below). If none were found, the charger will display "No BBWCs found" and go straight to a charge cycle without a BBWC device present.

Syncing – Setting of three specific current values and measuring all BBWC devices and running a match algorithm. These steps will be displayed as "Measure BBWCs - Iteration: x" (where x is 1, 2, or 3) signifying each measurement step.

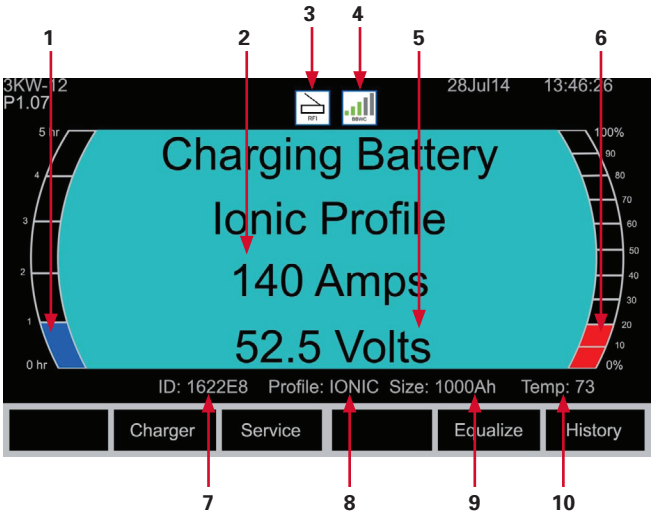
Enumerating – If the syncing state was successful and a match was found, the BBWC device will go to the enumerating state where the battery's serial number, capacity, programmed charge profile, etc. will be loaded on to the charger and the charge cycle will then begin using this data. This information is also displayed on the bottom of the charger display as well.

If the syncing state failed, the charger will display "No matching BBWCs" and go straight to a charge cycle without a BBWC device present.

Charging Display

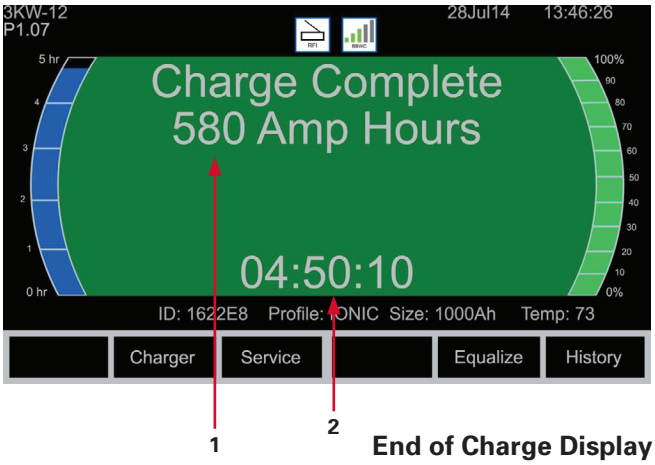
A few moments into the effective charge, the display will begin displaying the following charging information:

Ref	Description
1	Charge time bar graph
2	Charge DC current into battery
3	RFI transceiver is communicating with BBWC device
4	BBWC device link indicator
5	Charge DC voltage of battery, alternating with charge time, Ah, and V/C
6	Percent of charge bar graph
7	Battery S/N reported by BBWC device lithium only: battery information
8	Charge profile
9	Programmed battery size in Ah
10	Battery temperature



Charging Display

End of Charge Display
The display background turns green at the end of a normal charge cycle and shows “Charge Complete” at the top, followed by number of Ampere-hours returned to battery (1) and total charge time (2). ee illustration at right.



End of Charge Display

Equalization
An equalize charge can be added manually or automatically.

Manual Equalize
At the end of a normal charge, or during a charge cycle, press the Equalize button. An equalize charge will start after a normal charge cycle is complete. The start of an equalize charge is indicated by the message “Equalize Charge”. During the equalize charge, the charger displays the output current, and alternates between the battery voltage, volt per cell and remaining time of the equalize charge. Once equalize charge is complete, the display background turns green and the displays shows “Charge Complete”, indicating the battery is available for use. If the battery remains plugged in and refresh charge has been enabled, refresh charges will occur to maintain a full charge.

Automatic Equalize
If an equalize charge has been programmed in charger Equalize Configuration, an equalize charge will start automatically on the programmed day of the week after normal charge cycle is complete. Once equalize charge is complete, the display background turns green and the display shows “Charge Complete”, indicating the battery is available for use. If the battery remains plugged in and refresh charge has been enabled, refresh charges will occur to maintain a full charge.

Charger Information

Pressing the Charger button in idle mode (Connect Battery screen) will display Charger Information as well as reported faults.

Charger Serial Number
This number indicates complete information about the specific charger and will match the charger nameplate. It must be supplied with the part number on any correspondence or discussion regarding this charger.

Asset Number
Assigned by the customer and programmed at the factory or by an authorized service personnel.

Connects
Total number of times the charger has been connected to a battery.

Complete Equalizes
Total number of equalizes normally terminated.

Complete Charges
Total number of charges normally terminated.

Ah Returned
Total number of ampere-hours returned by the charger.

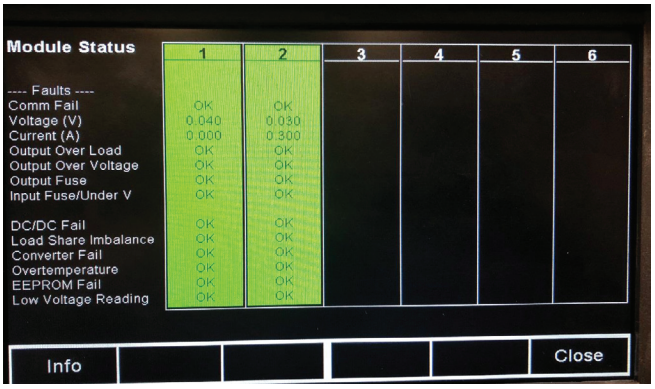
Faults

In case of a fault, one of the corresponding fault codes listed below will appear on the display. If it is a critical fault, charging will stop and the red fault LED will be illuminated.

Fault	Cause	Solution
Battery Disconnects While Charging	Occurs when a charging battery is disconnected from the charger without first stopping the charge cycle.	• Press the STOP button before disconnecting the battery. • Can be reset by connecting a battery to the charger.
Low Battery Voltage	Occurs when the battery is first connected and the voltage is between 1.0 and 1.8 volts/cell.	• Can be reset if battery voltage is between 1.8 and 2.4 volts/cell.
High Battery Voltage	Occurs when the battery is first connected and the voltage is above 2.4 volts/cell.	• Can be reset if battery voltage is between 1.8 and 2.4 volts/cell.
Charger Cell Size Exceeded	Occurs when the battery cell size does not match the charger nameplate.	• Check that the number of battery cells matches the charger nameplate.
Check Battery or Hot Battery	Occurs when the battery is overheating.	• Allow the battery to cool. • Battery may need service. • Can be reset by disconnecting the battery from the charger.
Thermal	Occurs when the charger is overheating.	• Check that fans are working. • Check ambient temperature (between 32° and 113°F (0° and 45°C). • Inspect to see if charger ventilation is obstructed or impaired.
Time Limit Before Gassing Exceeded	Occurs when the overall charge cycle time limit in start rate mode is exceeded.	• Can be reset by disconnecting the battery from the charger.
Time Limit After Gassing Exceeded	Occurs when the time limit after gassing is exceeded.	• Can be reset by disconnecting the battery from the charger.
Overall Charge Time Exceeded	With charge profile set to “Fast” this fault occurs when the maximum 3 hour charge time is exceeded.	• Check condition of the battery. • Can be reset by disconnecting the battery from the charger.

Module Status Display

This displays the status of each module installed in the charger. From Main Menu, press Charger button, then press Modules button. If OK is displayed under the module (shown as Module 1 at right), this indicates the module is operating properly. If FAIL is displayed under the module, this indicates a fault. Contact your servicing agent.



Info
Displays details about each module installed.

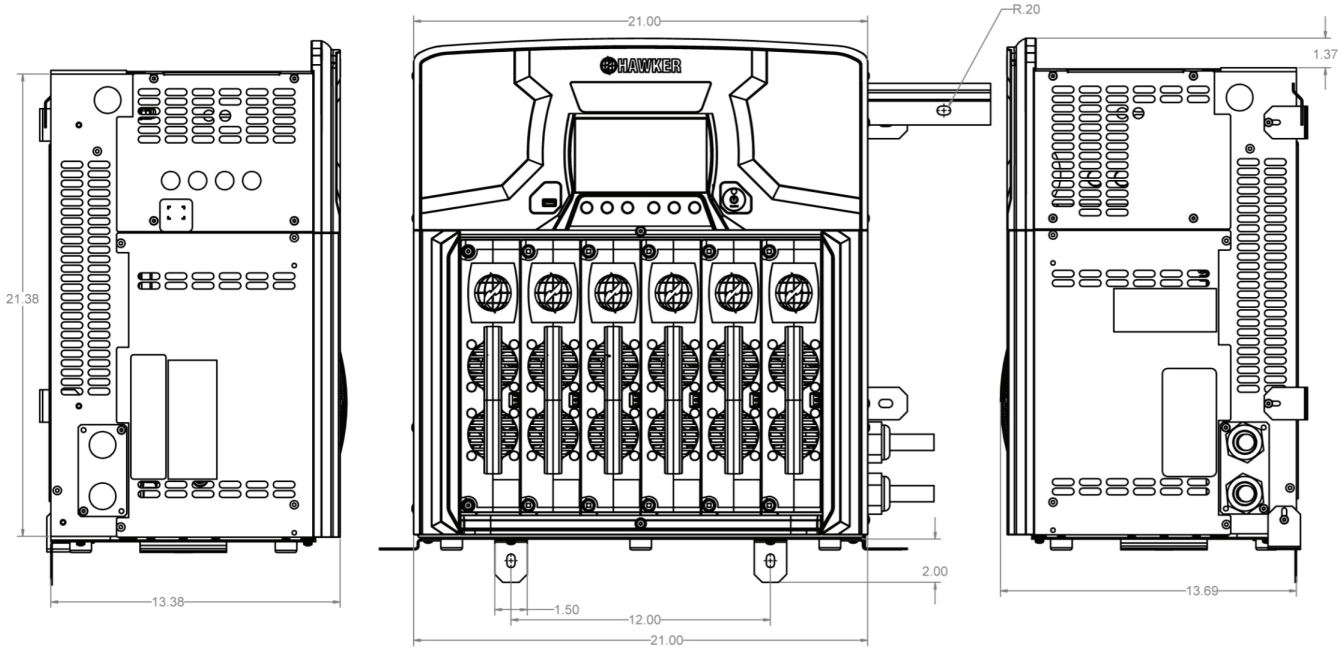
Module LED Status
The modules have LED indicators on the front. These can be observed to determine the status of that particular module:

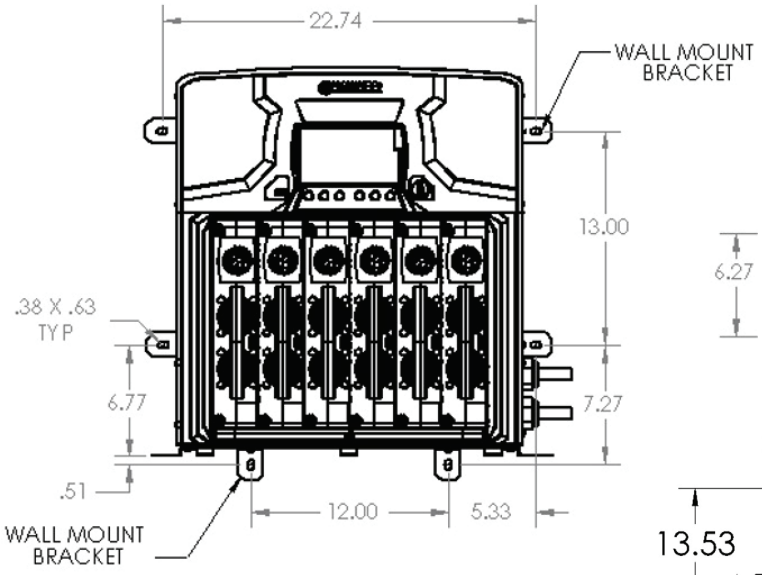
- **Flashing Green:** Module in Standby
- **Solid Green:** Module in Use
- **Red:** Module Fault
- **No LEDs:** Module Fault (assuming not in energy saver mode)

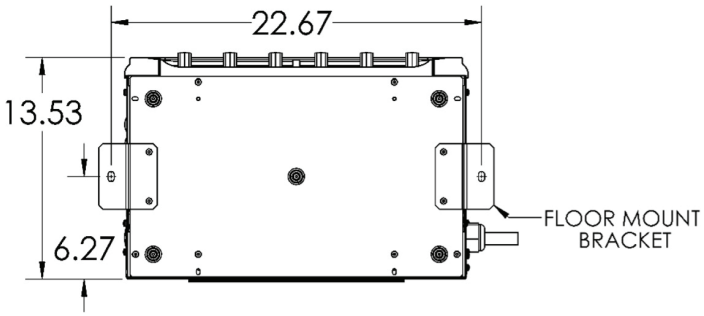
Mounting Dimensions

6-Bay Wall Mounting Dimensions

Dimensions shown are in inches.



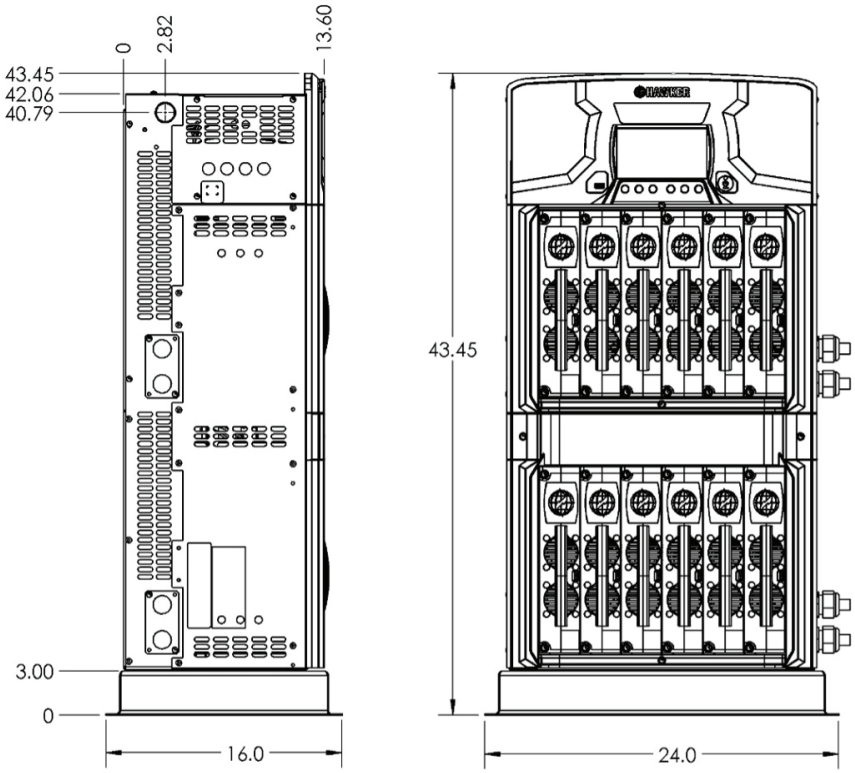


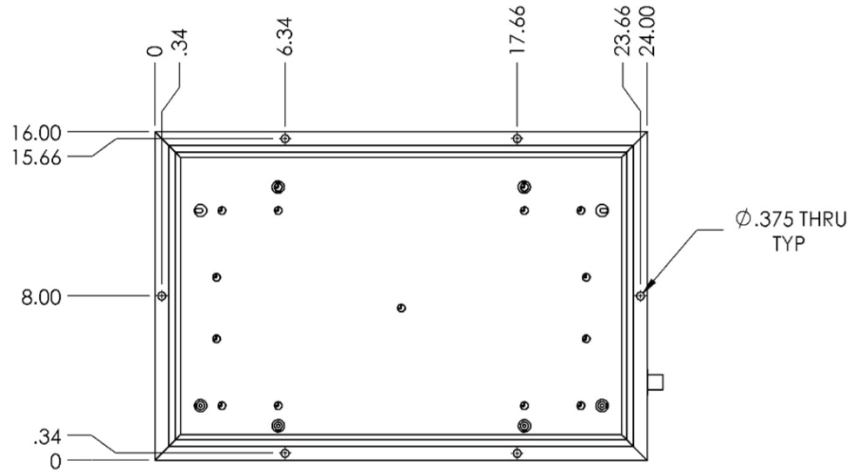


Mounting Dimensions

12-Bay Floor Mounting Dimensions

Dimensions shown are in inches.





Maintenance and Service

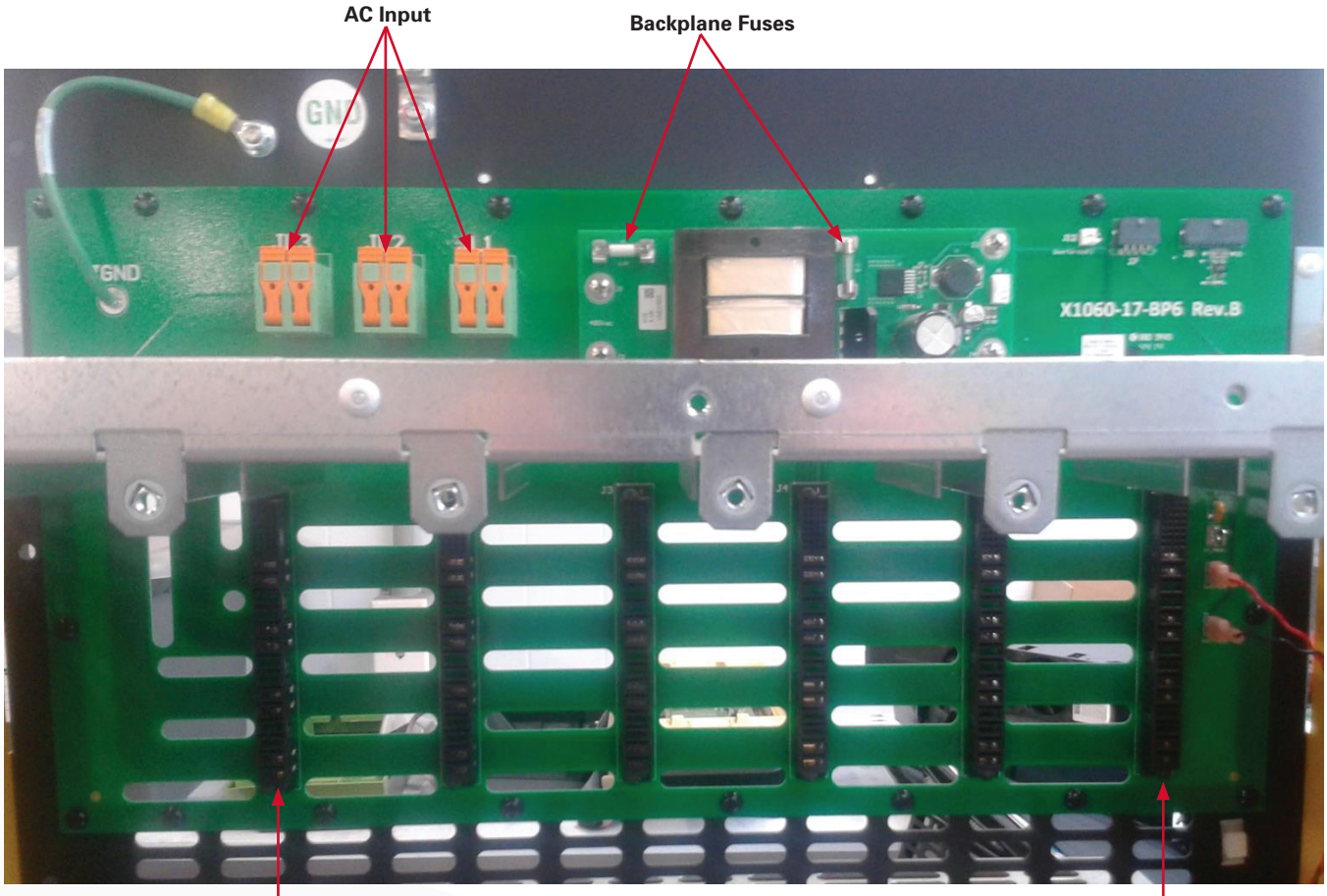
⚠ CAUTION THERE ARE DANGEROUS VOLTAGES WITHIN THE BATTERY CHARGER CABINET. ONLY QUALIFIED PERSONNEL SHOULD ATTEMPT TO ADJUST OR SERVICE THIS BATTERY CHARGER.

The charger requires a minimum of maintenance. Connections and terminals should be kept clean and tight. Follow recommended installation and make sure ventilation openings are not blocked.

Module Front

Component Locations

Inside View of a 6-Bay Cabinet



Technical Specifications

For LSM3 models, 208/220/240 V:

Model Number	AC Input			DC Output				Opportunity Capacity Range (Ah)	2 Hr Fast Capacity Range (Ah)	3 Hr Fast Capacity Range (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LSM3-48L-200G	208/220/240	37/35/32	59.2	3	5/12	12/18/24	200	100-800	100-400	100-600	43.45 x 24 x16	3/0	L	194
LSM3-48L-240G	208/220/240	44.4/42/38.4	59.2	3	6/12	12/18/24	240	100-960	100-480	100-720	43.45 x 24 x16	3/0	L	202
LSM3-48L-280G	208/220/240	51.8/49/44.8	59.2	3	7/12	12/18/24	280	100-1120	100-560	100-840	43.45 x 24 x16	3/0	L	210
LSM3-48L-320G	208/220/240	59.2/56/51.2	59.2	3	8/12	12/18/24	320	100-1280	100-640	100-960	43.45 x 24 x16	3/0	L	218
LSM3-48L-360GP	208/220/240	66.6/63/57.6	88.8	3	9/12	12/18/24	360	100-1440	100-720	100-1080	43.45 x 24 x16	Dual 3/0	L	226
LSM3-48L-400GP	208/220/240	74/70/64	88.8	3	10/12	12/18/24	400	100-1600	100-800	100-1200	43.45 x 24 x16	Dual 3/0	L	234
LSM3-48L-440GP	208/220/240	81.4/77/70.4	88.8	3	11/12	12/18/24	440	100-1760	100-880	100-1320	43.45 x 24 x16	Dual 3/0	L	242
LSM3-48L-480GP	208/220/240	88.8/84/76.8	88.8	3	12/12	12/18/24	480	100-1920	100-960	100-1440	43.45 x 24 x16	Dual 3/0	L	250

For LSM3 models, 440 V:

Model Number	AC Input			DC Output				Opportunity Capacity Range (Ah)	2 Hr Fast Capacity Range (Ah)	3 Hr Fast Capacity Range (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LSM3-48F-180H	440	15.9	31.8	3	3/6	12	210	100-840	100-420	100-630	23.17 x 21 x 13.77	3/0	F	86
						18	195	100-780	100-390	100-585				
						24	180	100-720	100-360	100-540				
LSM3-48F-240H	440	21.2	31.8	3	4/6	12	280	100-1120	100-560	100-840	23.17 x 21 x 13.77	3/0	F	94
						18	260	100-1040	100-520	100-780				
						24	240	100-960	100-480	100-720				
LSM3-48F-300H	440	26.5	31.8	3	5/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	102
						18	320	100-1280	100-640	100-960				
						24	300	100-1200	100-600	100-900				
LSM3-48F-320H	440	31.8	31.8	3	6/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	110
						18	320	100-1280	100-640	100-960				
						24	320	100-1280	100-640	100-960				
LSM3-48F-300HP	440	26.5	31.8	3	5/6	12	350	100-1400	100-700	100-1050	23.17 x 21 x 13.77	Dual 3/0	F	115
						18	325	100-1300	100-650	100-975				
						24	300	100-1200	100-600	100-900				

Technical Specifications (cont.)

Model Number	AC Input			DC Output										
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Opportunity Capacity Range (Ah)	2 Hr Fast Capacity Range (Ah)	3 Hr Fast Capacity Range (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
LSM3-48F-360HP	440	31.8	31.8	3	6/6	12	420	100-1680	100-840	100-1260	23.17 x 21 x 13.77	Dual 3/0	F	123
						18	390	100-1560	100-780	100-1170				
						24	360	100-1440	100-720	100-1080				
LSM3C48F-180H	440	15.9	31.8	3	3/6	12	210	100-840	100-420	100-630	23.17 x 21 x 13.77	3/0	F	86
						18	195	100-780	100-390	100-585				
						24	180	100-720	100-360	100-540				
LSM3C48F-240H	440	21.2	31.8	3	4/6	12	280	100-1120	100-560	100-840	23.17 x 21 x 13.77	3/0	F	94
						18	260	100-1040	100-520	100-780				
						24	240	100-960	100-480	100-720				
LSM3C48F-300H	440	26.5	31.8	3	5/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	102
						18	320	100-1280	100-640	100-960				
						24	300	100-1200	100-600	100-900				
LSM3C48F-320H	440	31.8	31.8	3	6/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	110
						18	320	100-1280	100-640	100-960				
						24	320	100-1280	100-640	100-960				
LSM3C48F-300HP	440	26.5	31.8	3	5/6	12	350	100-1400	100-700	100-1050	23.17 x 21 x 13.77	Dual 3/0	F	115
						18	325	100-1300	100-650	100-975				
						24	300	100-1200	100-600	100-900				
LSM3C48F-360HP	440	31.8	31.8	3	6/6	12	420	100-1680	100-840	100-1260	23.17 x 21 x 13.77	Dual 3/0	F	123
						18	390	100-1560	100-780	100-1170				
						24	360	100-1440	100-720	100-1080				
LSM3-80F-108H	440	15.9	31.8	3	3/6	36	120	100 - 480	100 - 240	100 - 360	23.17 x 21 x 13.77	3/0	F	86
						40	108	100 - 430	100 - 215	100 - 325				
LSM3-80F-144H	440	21.2	31.8	3	4/6	36	160	100 - 640	100 - 320	100 - 480	23.17 x 21 x 13.77	3/0	F	94
						40	144	100 - 575	100 - 285	100 - 430				
LSM3-80F-180H	440	26.5	31.8	3	5/6	36	200	100 - 800	100 - 400	100 - 600	23.17 x 21 x 13.77	3/0	F	102
						40	180	100 - 720	100 - 360	100 - 540				
LSM3-80F-216H	440	31.8	31.8	3	6/6	36	240	100 - 960	100 - 480	100 - 720	23.17 x 21 x 13.77	3/0	F	110
						40	216	100 - 865	100 - 430	100 - 650				
LSM3C80F-108H	440	15.9	31.8	3	3/6	36	120	100 - 480	100 - 240	100 - 360	23.17 x 21 x 13.77	3/0	F	86
						40	108	100 - 430	100 - 215	100 - 325				

Technical Specifications (cont.)

Model Number	AC Input				DC Output							Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Opportunity Capacity Range (Ah)	2 Hr Fast Capacity Range (Ah)	3 Hr Fast Capacity Range (Ah)					
LSM3C80F-144H	440	21.2	31.8	3	4/6	36	160	100 - 640	100 - 320	100 - 480		23.17 x 21 x 13.77	3/0	F	94
						40	144	100 - 575	100 - 285	100 - 430					
LSM3C80F-180H	440	26.5	31.8	3	5/6	36	200	100 - 800	100 - 400	100 - 600		23.17 x 21 x 13.77	3/0	F	102
						40	180	100 - 720	100 - 360	100 - 540					
LSM3C80F-216H	440	31.8	31.8	3	6/6	36	240	100 - 960	100 - 480	100 - 720		23.17 x 21 x 13.77	3/0	F	110
						40	216	100 - 865	100 - 430	100 - 650					
LSM3-48L-300HP	440	26.5	63.6	3	5/12	12	350	100-1400	100-700	100-1050		43.45 x 24 x16	Dual 3/0	L	194
						18	325	100-1300	100-650	100-975					
						24	300	100-1200	100-700	100-900					
LSM3-48L-360HP	440	31.8	63.6	3	6/12	12	420	100-1680	100-840	100-1260		43.45 x 24 x16	Dual 3/0	L	202
						18	390	100-1560	100-780	100-1170					
						24	360	100-1440	100-720	100-1080					
LSM3-48L-420HP	440	37.1	63.6	3	7/12	12	490	100-1960	100-980	100-1470		43.45 x 24 x16	Dual 3/0	L	210
						18	455	100-1820	100-910	100-1365					
						24	420	100-1680	100-840	100-1260					
LSM3-48L-480HP	440	42.4	63.6	3	8/12	12	560	100-2240	100-1120	100-1680		43.45 x 24 x16	Dual 3/0	L	218
						18	520	100-2080	100-1040	100-1560					
						24	480	100-1920	100-960	100-1440					
LSM3-48L-540HP	440	47.7	63.6	3	9/12	12	630	100-2520	100-1260	100-1890		43.45 x 24 x16	Dual 3/0	L	226
						18	585	100-2340	100-1170	100-1755					
						24	540	100-2160	100-1080	100-1620					
LSM3-48L-600HP	440	53	63.6	3	10/12	12	640	100-2560	100-1280	100-1920		43.45 x 24 x16	Dual 3/0	L	234
						18	640	100-2560	100-1280	100-1920					
						24	600	100-2400	100-1200	100-1800					
LSM3-48L-640HP	440	58.3	63.6	3	11/12	12	640	100-2560	100-1280	100-1920		43.45 x 24 x16	Dual 3/0	L	242
						18	640	100-2560	100-1280	100-1920					
						24	640	100-2560	100-1280	100-1920					
LSM3C-48L-300HP	440	26.5	63.6	3	5/12	12	350	100-1400	100-700	100-1050		43.45 x 24 x16	Dual 3/0	L	194
						18	325	100-1300	100-650	100-975					
						24	300	100-1200	100-600	100-900					

Technical Specifications (cont.)

Model Number	AC Input				DC Output									
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Opportunity Capacity Range (Ah)	2 Hr Fast Capacity Range (Ah)	3 Hr Fast Capacity Range (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
LSM3C-48L-360HP	440	31.8	63.6	3	6/12	12	420	100-1680	100-840	100-1260	43.45 x 24 x16	Dual 3/0	L	202
						18	390	100-1560	100-780	100-1170				
						24	360	100-1440	100-720	100-1080				
LSM3C-48L-420HP	440	37.1	63.6	3	7/12	12	490	100-1960	100-980	100-1470	43.45 x 24 x16	Dual 3/0	L	210
						18	455	100-1820	100-910	100-1365				
						24	420	100-1680	100-840	100-1260				
LSM3C-48L-480HP	440	42.4	63.6	3	8/12	12	560	100-2240	100-1120	100-1680	43.45 x 24 x16	Dual 3/0	L	218
						18	520	100-2080	100-1040	100-1560				
						24	480	100-1920	100-960	100-1440				
LSM3C-48L-540HP	440	47.7	63.6	3	9/12	12	630	100-2520	100-1260	100-1890	43.45 x 24 x16	Dual 3/0	L	226
						18	585	100-2340	100-1170	100-1755				
						24	540	100-2160	100-1080	100-1620				
LSM3C-48L-600HP	440	53	63.6	3	10/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	234
						18	640	100-2560	100-1280	100-1920				
						24	600	100-2400	100-1200	100-1800				
LSM3C-48L-640HP	440	58.3	63.6	3	11/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	242
						18	640	100-2560	100-1280	100-1920				
						24	640	100-2560	100-1280	100-1920				
LSM3-80L-180H	440	26.5	42.4	3	5/12	36	200	100-800	100-400	100-600	43.45 x 24 x16	3/0	L	194
						40	180	100-720	100-360	100-540				
LSM3-80L-216H	440	31.8	42.4	3	6/12	36	240	100-960	100-480	100-720	43.45 x 24 x16	3/0	L	202
						40	216	100-864	100-432	100-648				
LSM3-80L-252H	440	37.1	42.4	3	7/12	36	280	100-1120	100-560	100-840	43.45 x 24 x16	3/0	L	210
						40	252	100-1008	100-504	100-756				
LSM3-80L-288H	440	42.4	42.4	3	8/12	36	320	100-1280	100-640	100-960	43.45 x 24 x16	3/0	L	218
						40	288	100-1152	100-576	100-864				
LSM3-80L-324HP	440	47.7	63.6	3	9/12	36	360	100-1440	100-720	100-1080	43.45 x 24 x16	Dual 3/0	L	226
						40	324	100-1296	100-648	100-972				
LSM3-80L-360HP	440	53	63.6	3	10/12	36	400	100-1600	100-800	100-1200	43.45 x 24 x16	Dual 3/0	L	234
						40	360	100-1440	100-720	100-1080				

Technical Specifications (cont.)

Model Number	AC Input				DC Output			Opportunity Capacity Range (Ah)	2 Hr Fast Capacity Range (Ah)	3 Hr Fast Capacity Range (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LSM3-80L-396HP	440	58.3	63.6	3	11/12	36	440	100-1760	100-880	100-1320	43.45 x 24 x16	Dual 3/0	L	242
						40	396	100-1584	100-792	100-1188				
LSM3-80L-432HP	440	63.6	63.6	3	12/12	36	480	100-1920	100-960	100-1440	43.45 x 24 x16	Dual 3/0	L	250
						40	432	100-1728	100-864	100-1296				
LSM3C80L-180H	440	26.5	42.4	3	5/12	36	200	100-800	100-400	100-600	43.45 x 24 x16	3/0	L	194
						40	180	100-720	100-360	100-540				
LSM3C80L-216H	440	31.8	42.4	3	6/12	36	240	100-960	100-480	100-720	43.45 x 24 x16	3/0	L	202
						40	216	100-864	100-432	100-648				
LSM3C80L-252H	440	37.1	42.4	3	7/12	36	280	100-1120	100-560	100-840	43.45 x 24 x16	3/0	L	210
						40	252	100-1008	100-504	100-756				
LSM3C80L-288H	440	42.4	42.4	3	8/12	36	320	100-1280	100-640	100-960	43.45 x 24 x16	3/0	L	218
						40	288	100-1152	100-576	100-864				
LSM3C80L-324HP	440	47.7	63.6	3	9/12	36	360	100-1440	100-720	100-1080	43.45 x 24 x16	Dual 3/0	L	226
						40	324	100-1296	100-648	100-972				
LSM3C80L-360HP	440	53	63.6	3	10/12	36	400	100-1600	100-800	100-1200	43.45 x 24 x16	Dual 3/0	L	234
						40	360	100-1440	100-720	100-1080				
LSM3C80L-396HP	440	58.3	63.6	3	11/12	36	440	100-1760	100-880	100-1320	43.45 x 24 x16	Dual 3/0	L	242
						40	396	100-1584	100-792	100-1188				
LSM3C80L-432HP	440	63.6	63.6	3	12/12	36	480	100-1920	100-960	100-1440	43.45 x 24 x16	Dual 3/0	L	250
						40	432	100-1728	100-864	100-1296				

Technical Specifications (cont.)

For LSM3 models, 480 V:

Model Number	AC Input			DC Output				Opportunity Capacity Range (Ah)	2 Hr Fast Capacity Range (Ah)	3 Hr Fast Capacity Range (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LSM3-48F-180Y	480	14.4	28.8	3	3/6	12	240	100-960	100-480	100-720	23.17 x 21 x 13.77	3/0	F	86
						18	240	100-960	100-480	100-720				
						24	180	100-720	100-360	100-540				
LSM3-48F-240Y	480	19.2	28.8	3	4/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	94
						18	320	100-1280	100-640	100-960				
						24	240	100-960	100-480	100-720				
LSM3-48F-300Y	480	24	28.8	3	5/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	102
						18	320	100-1280	100-640	100-960				
						24	300	100-1200	100-600	100-900				
LSM3-48F-320Y	480	28.8	28.8	3	6/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	110
						18	320	100-1280	100-640	100-960				
						24	320	100-1280	100-640	100-960				
LSM3-48F-300YP	480	24	28.8	3	5/6	12	400	100-1600	100-800	100-1200	23.17 x 21 x 13.77	Dual 3/0	F	115
						18	400	100-1600	100-800	100-1200				
						24	300	100-1200	100-600	100-900				
LSM3-48F-360YP	480	28.8	28.8	3	6/6	12	480	100-1920	100-960	100-1440	23.17 x 21 x 13.77	Dual 3/0	F	123
						18	480	100-1920	100-960	100-1440				
						24	360	100-1440	100-720	100-1080				
LSM3C48F-180Y	480	14.4	28.8	3	3/6	12	240	100-960	100-480	100-720	23.17 x 21 x 13.77	3/0	F	86
						18	240	100-960	100-480	100-720				
						24	180	100-720	100-360	100-540				
LSM3C48F-240Y	480	19.2	28.8	3	4/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	94
						18	320	100-1280	100-640	100-960				
						24	240	100-960	100-480	100-720				
LSM3C48F-300Y	480	24	28.8	3	5/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	102
						18	320	100-1280	100-640	100-960				
						24	300	100-1200	100-600	100-900				
LSM3C48F-320Y	480	28.8	28.8	3	6/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	110
						18	320	100-1280	100-640	100-960				
						24	320	100-1280	100-640	100-960				

Technical Specifications (cont.)

Model Number	AC Input			DC Output								Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Opportunity Capacity Range (Ah)	2 Hr Fast Capacity Range (Ah)	3 Hr Fast Capacity Range (Ah)					
LSM3C48F-300YP	480	24	28.8	3	5/6	12	400	100-1600	100-800	100-1200		23.17 x 21 x 13.77	Dual 3/0	F	115
						18	400	100-1600	100-800	100-1200					
						24	300	100-1200	100-600	100-900					
LSM3C48F-360YP	480	28.8	28.8	3	6/6	12	480	100-1920	100-960	100-1440		23.17 x 21 x 13.77	Dual 3/0	F	123
						18	480	100-1920	100-960	100-1440					
						24	360	100-1440	100-720	100-1080					
LSM3-80F-108Y	480	14.4	28.8	3	3/6	36	120	100-480	100 - 240	100 - 360		23.17 x 21 x 13.77	3/0	F	86
						40	108	100-432	100 - 215	100 - 325					
LSM3-80F-144Y	480	19.2	28.8	3	4/6	36	160	100-640	100 - 320	100 - 480		23.17 x 21 x 13.77	3/0	F	94
						40	144	100-576	100 - 285	100 - 430					
LSM3-80F-180Y	480	24	28.8	3	5/6	36	200	100-800	100 - 400	100 - 600		23.17 x 21 x 13.77	3/0	F	102
						40	180	100-720	100 - 360	100 - 540					
LSM3-80F-216Y	480	28.8	28.8	3	6/6	36	240	100-960	100 - 480	100 - 720		23.17 x 21 x 13.77	3/0	F	110
						40	216	100-864	100 - 430	100 - 650					
LSM3C80F-108	480	14.4	28.8	3	3/6	36	120	100 - 480	100 - 240	100 - 360		23.17 x 21 x 13.77	3/0	F	86
						40	108	100 - 430	100 - 215	100 - 325					
LSM3C80F-144Y	480	19.2	28.8	3	4/6	36	160	100 - 640	100 - 320	100 - 480		23.17 x 21 x 13.77	3/0	F	94
						40	144	100 - 575	100 - 285	100 - 430					
LSM3C80F-180Y	480	24	28.8	3	5/6	36	200	100 - 800	100 - 400	100 - 600		23.17 x 21 x 13.77	3/0	F	102
						40	180	100 - 720	100 - 360	100 - 540					
LSM3C80F-216Y	480	28.8	28.8	3	6/6	36	240	100 - 960	100 - 480	100 - 720		23.17 x 21 x 13.77	3/0	F	110
						40	216	100 - 865	100 - 430	100 - 650					
LSM3-48L-300YP	480	24	57.6	3	5/12	12	400	100-1600	100-800	100-1200		43.45 x 24 x16	Dual 3/0	L	194
						18	400	100-1600	100-800	100-1200					
						24	300	100-1200	100-600	100-900					
LSM3-48L-360YP	480	28.8	57.6	3	6/12	12	480	100-1920	100-960	100-1440		43.45 x 24 x16	Dual 3/0	L	202
						18	480	100-1920	100-960	100-1440					
						24	360	100-1440	100-720	100-1080					
LSM3-48L-420YP	480	33.6	57.6	3	7/12	12	560	100-2240	100-1120	100-1680		43.45 x 24 x16	Dual 3/0	L	210
						18	560	100-2240	100-1120	100-1680					
						24	420	100-1680	100-840	100-1260					

Technical Specifications (cont.)

Model Number	AC Input				DC Output									
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Opportunity Capacity Range (Ah)	2 Hr Fast Capacity Range (Ah)	3 Hr Fast Capacity Range (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
LSM3-48L-480YP	480	38.4	57.6	3	8/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	218
						18	640	100-2560	100-1280	100-1920				
						24	480	100-1920	100-960	100-1440				
LSM3-48L-540YP	480	43.2	57.6	3	9/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	226
						18	640	100-2560	100-1280	100-1920				
						24	540	100-2160	100-1080	100-1620				
LSM3-48L-600YP	480	48	57.6	3	10/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	234
						18	640	100-2560	100-1280	100-1920				
						24	600	100-2400	100-1200	100-1800				
LSM3-48L-640YP	480	52.8	57.6	3	11/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	242
						18	640	100-2560	100-1280	100-1920				
						24	640	100-2560	100-1280	100-1920				
LSM3C48L-300YP	480	24	57.6	3	5/12	12	400	100-1600	100-800	100-1200	43.45 x 24 x16	Dual 3/0	L	194
						18	400	100-1600	100-800	100-1200				
						24	300	100-1200	100-600	100-900				
LSM3C48L-360YP	480	28.8	57.6	3	6/12	12	480	100-1920	100-960	100-1440	43.45 x 24 x16	Dual 3/0	L	202
						18	480	100-1920	100-960	100-1440				
						24	360	100-1440	100-720	100-1080				
LSM3C48L-420YP	480	33.6	57.6	3	7/12	12	560	100-2240	100-1120	100-1680	43.45 x 24 x16	Dual 3/0	L	210
						18	560	100-2240	100-1120	100-1680				
						24	420	100-1680	100-840	100-1260				
LSM3C48L-480YP	480	38.4	57.6	3	8/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	218
						18	640	100-2560	100-1280	100-1920				
						24	480	100-1920	100-960	100-1440				
LSM3C48L-540YP	480	43.2	57.6	3	9/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	226
						18	640	100-2560	100-1280	100-1920				
						24	540	100-2160	100-1080	100-1620				
LSM3C48L-600YP	480	48	57.6	3	10/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	234
						18	640	100-2560	100-1280	100-1920				
						24	600	100-2400	100-1200	100-1800				

Technical Specifications (cont.)

Model Number	AC Input				DC Output									
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Opportunity Capacity Range (Ah)	2 Hr Fast Capacity Range (Ah)	3 Hr Fast Capacity Range (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
LSM3C48L-640YP	480	52.8	57.6	3	11/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	242
						18	640	100-2560	100-1280	100-1920				
						24	640	100-2560	100-1280	100-1920				
LSM3-80L-180Y	480	14.4	38.4	3	5/12	36	200	100-800	100-400	100-600	43.45 x 24 x16	3/0	L	194
						40	180	100-720	100-360	100-540				
LSM3-80L-216Y	480	28.8	38.4	3	6/12	36	240	100-960	100-480	100-720	43.45 x 24 x16	3/0	L	202
						40	216	100-864	100-432	100-648				
LSM3-80L-252Y	480	33.6	38.4	3	7/12	36	280	100-1120	100-560	100-840	43.45 x 24 x16	3/0	L	210
						40	252	100-1008	100-504	100-756				
LSM3-80L-288Y	480	38.4	38.4	3	8/12	36	320	100-1280	100-640	100-960	43.45 x 24 x16	3/0	L	218
						40	288	100-1152	100-576	100-864				
LSM3-80L-324YP	480	43.2	57.6	3	9/12	36	360	100-1440	100-720	100-1080	43.45 x 24 x16	Dual 3/0	L	226
						40	324	100-1296	100-648	100-972				
LSM3-80L-360YP	480	48	57.6	3	10/12	36	400	100-1600	100-800	100-1200	43.45 x 24 x16	Dual 3/0	L	234
						40	360	100-1440	100-720	100-1080				
LSM3-80L-396YP	480	52.8	57.6	3	11/12	36	440	100-1760	100-880	100-1320	43.45 x 24 x16	Dual 3/0	L	242
						40	396	100-1584	100-792	100-1188				
LSM3-80L-432YP	480	57.6	57.6	3	21/12	36	480	100-1920	100-960	100-1440	43.45 x 24 x16	Dual 3/0	L	250
						40	432	100-1728	100-864	100-1296				
LSM3C80L-180Y	480	14.4	38.4	3	5/12	36	200	100-800	100-400	100-600	43.45 x 24 x16	3/0	L	194
						40	180	100-720	100-360	100-540				
LSM3C80L-216Y	480	28.8	38.4	3	6/12	36	240	100-960	100-480	100-720	43.45 x 24 x16	3/0	L	202
						40	216	100-864	100-432	100-648				
LSM3C80L-252Y	480	33.6	38.4	3	7/12	36	280	100-1120	100-560	100-840	43.45 x 24 x16	3/0	L	210
						40	252	100-1008	100-504	100-756				
LSM3C80L-288Y	480	38.4	38.4	3	8/12	36	320	100-1280	100-640	100-960	43.45 x 24 x16	3/0	L	218
						40	288	100-1152	100-576	100-864				
LSM3C80L-324YP	480	43.2	57.6	3	9/12	36	360	100-1440	100-720	100-1080	43.45 x 24 x16	Dual 3/0	L	226
						40	324	100-1296	100-648	100-972				

Technical Specifications (cont.)

Model Number	AC Input				DC Output			Opportunity Capacity Range (Ah)	2 Hr Fast Capacity Range (Ah)	3 Hr Fast Capacity Range (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LSM3C80L-360YP	480	48	57.6	3	10/12	36	400	100-1600	100-800	100-1200	43.45 x 24 x16	Dual 3/0	L	234
						40	360	100-1440	100-720	100-1080				
LSM3C80L-396YP	480	52.8	57.6	3	11/12	36	440	100-1760	100-880	100-1320	43.45 x 24 x16	Dual 3/0	L	242
						40	396	100-1584	100-792	100-1188				
LSM3C80L-432YP	480	57.6	57.6	3	21/12	36	480	100-1920	100-960	100-1440	43.45 x 24 x16	Dual 3/0	L	250
						40	432	100-1728	100-864	100-1296				

For LSM3 models, 600 V:

LSM3-48F-180C	600	11.4	22.8	3	3/6	12	240	100-960	100-480	100-720	23.17 x 21 x 13.77	3/0	F	86
						18	240	100-960	100-480	100-720				
						24	180	100-720	100-360	100-540				
LSM3-48F-240C	600	15.2	22.8	3	4/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	94
						18	320	100-1280	100-640	100-960				
						24	240	100-960	100-480	100-720				
LSM3-48F-300C	600	19	22.8	3	5/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	102
						18	320	100-1280	100-640	100-960				
						24	300	100-1200	100-600	100-900				
LSM3-48F-320C	600	22.8	22.8	3	6/6	12	320	100-1280	100-640	100-960	23.17 x 21 x 13.77	3/0	F	110
						18	320	100-1280	100-640	100-960				
						24	320	100-1280	100-640	100-960				
LSM3-48F-300CP	600	19	22.8	3	5/6	12	400	100-1600	100-800	100-1200	23.17 x 21 x 13.77	Dual 3/0	F	115
						18	400	100-1600	100-800	100-1200				
						24	300	100-1200	100-600	100-900				
LSM3-48F-360CP	600	22.8	22.8	3	6/6	12	480	100-1920	100-960	100-1440	23.17 x 21 x 13.77	Dual 3/0	F	123
						18	480	100-1920	100-960	100-1440				
						24	360	100-1440	100-720	100-1080				
LSM3-80F-108C	600	11.4	22.8	3	3/6	36	120	100 - 480	100 - 240	100 - 360	23.17 x 21 x 13.77	3/0	F	86
						40	108	100 - 430	100 - 215	100 - 325				
LSM3-80F-144C	600	15.2	22.8	3	4/6	36	160	100 - 640	100 - 320	100 - 480	23.17 x 21 x 13.77	3/0	F	94
						40	144	100 - 575	100 - 285	100 - 430				

Technical Specifications (cont.)

Model Number	AC Input			DC Output				Opportunity Capacity Range (Ah)	2 Hr Fast Capacity Range (Ah)	3 Hr Fast Capacity Range (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LSM3-80F-180C	600	19	22.8	3	5/6	36	200	100 - 800	100 - 400	100 - 600	23.17 x 21 x 13.77	3/0	F	102
						40	180	100 - 720	100 - 360	100 - 540				
LSM3-80F-216C	600	22.8	22.8	3	6/6	36	240	100 - 960	100 - 480	100 - 720	23.17 x 21 x 13.77	3/0	F	110
						40	216	100 - 865	100 - 430	100 - 650				
LSM3-48L-300CP	600	19	45.6	3	5/12	12	400	100-1600	100-800	100-1200	43.45 x 24 x16	Dual 3/0	L	194
						18	400	100-1600	100-800	100-1200				
						24	300	100-1200	100-600	100-900				
LSM3-48L-360CP	600	22.8	45.6	3	6/12	12	480	100-1920	100-960	100-1440	43.45 x 24 x16	Dual 3/0	L	202
						18	480	100-1920	100-960	100-1440				
						24	360	100-1440	100-720	100-1080				
LSM3-48L-420CP	600	26.6	45.6	3	7/12	12	560	100-2240	100-1120	100-1680	43.45 x 24 x16	Dual 3/0	L	210
						18	560	100-2240	100-1120	100-1680				
						24	420	100-1680	100-840	100-1260				
LSM3-48L-480CP	600	30.4	45.6	3	8/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	218
						18	640	100-2560	100-1280	100-1920				
						24	480	100-1920	100-960	100-1440				
LSM3-48L-540CP	600	34.2	45.6	3	9/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	226
						18	640	100-2560	100-1280	100-1920				
						24	540	100-2160	100-1080	100-1620				
LSM3-48L-600CP	600	38	45.6	3	10/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	234
						18	640	100-2560	100-1280	100-1920				
						24	600	100-2400	100-1200	100-1800				
LSM3-48L-640CP	600	41.8	45.6	3	11/12	12	640	100-2560	100-1280	100-1920	43.45 x 24 x16	Dual 3/0	L	242
						18	640	100-2560	100-1280	100-1920				
						24	640	100-2560	100-1280	100-1920				

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